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ABSTRACT

A problem solving skill was investigated to provide direction for training strategies for a proposed personal problem solving training program. There were eight treatment groups utilized including video-tape modeling, audiotape modeling, social modeling through means of a written booklet, parallel treatments for each of these using social reinforcement of desirable verbal responses, and a control group designed to yield baseline data. There were nine criteria derived from three criterion devices which encompassed two problem solving simulations and a self assessment device. Conclusions were: (1) no one strategy proved optimal; (2) social reinforcement did have an effect upon some problem solving behaviors examined; (3) no training medium was found completely effective; (4) audiotape and written booklet procedures were not significantly different in their effect; (5) the oral lecture was no more effective than the baseline control treatment; and (6) the measures may have lacked the necessary sensitivity to discriminate between problem solvers. (Author/EK)

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AN EXPERIMENTAL EVALUATION OF METHODS OF TEACHING STUDENTS TO CONSIDER ALTERNATIVE PROBLEM SOLUTIONS

Guidance Research Program

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AN EXPERIMENTAL EVALUATION OF METHODS OF TEACHING STUDENTS TO CONSIDER ALTERNATIVE PROBLEM SOLUTIONS

Dennis Earl Nelson, Ph.D.
Stanford University, 1970

Problem.

Problem situations (i.e., those situations in which the appropriate or optimal response is not immediately obvious) are frequent and recurrent throughout life. Guidance has often been viewed as having a major responsibility for assisting young people to be effective personal problem solvers. Psychological research in human problem solving has been predominantly laboratory-oriented and has dealt primarily with problems far removed from the real-life choice situations of daily life. Though guidance-oriented research has to some degree avoided these deficiencies, an examination of attempts to train individuals to solve their personal problems more wisely reveals woefully inadequate progress toward this priority goal of guidance.

Design.

A problem-solving skill postulated to be of key importance (i.e., the consideration of alternative problem solutions) was selected for an investigation aimed at providing direction for optimal training strategies for a proposed personal problem-solving training program. Eight treatment groups were utilized including video-tape modeling, audio-tape modeling, social modeling through means of a written booklet, parallel treatments for each of these three using social reinforcement of subjects' desirable verbal responses, a group which received a live lecture, and an active control group designed to yield baseline data. Nine criteria were derived from three criterion devices which included two problem-solving simulations and a self-assessment device.

Hypotheses.

(1) Subjects assigned to the video-tape with reinforcement condition will score higher on the criteria than subjects assigned to any other treatment. (2) Subjects assigned to the three treatment conditions involving social reinforcement will score higher on the criteria than subjects exposed to similar conditions without reinforcement. (3) Subjects assigned to the two video-tape treatment conditions will score higher on the criteria than subjects assigned to the two treatments involving written booklets or to the treatments involving audio-tape or oral lecture or to the baseline control condition. (4) Subjects assigned to the two audio-tape treatment conditions will score higher on the criteria than subjects assigned to the two written booklet treatments. (5) Subjects assigned to the oral lecture treatment will score higher on the criteria than subjects assigned to the baseline control treatment. No interactions between media, the use of reinforcement, and the sex of the subjects were hypothesized.

Results and Conclusions.

Results at the $p<.10$ level produced little support for any of the five hypotheses. In no instance did data from more than one of the dependent variables support each of the five major hypotheses. The most fruitful findings were found in significant first and second order interaction effects. Among the conclusions were the following. (1) No one training strategy of those investigated proved to be optimal for helping students to acquire effective problem-solving behaviors. The most useful strategy seems to depend on factors such as the particular behavior being trained. (2) Social reinforcement did have an effect upon some problem-solving behaviors examined but that effect was confined to the specific behaviors for which the reinforcement was given and to behaviors closely related

to them. (3) No training medium was found to be most effective irrespective of either the specific problem-solving behaviors being assessed or such variables as the use of reinforcement and the sex of the subjects. (4) The audio-tape and written booklet procedures did not prove to be significantly different in their effect upon the dependent variables. (5) The oral lecture was not significantly more effective than the baseline control treatment on any of the criteria. (6) A considerable number of problem-solving behaviors were exhibited by subjects in all of the treatment groups and the criterion measures may have lacked the necessary sensitivity to discriminate between effective and ineffective problem solvers.

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I. PROBLEM, REVIEW OF LITERATURE, AND RATIONALE

Guidance and Human Problem Solving

Situations in which the appropriate response is not immediately obvious are both frequent and pervasive throughout life (Siegel, Siegel, and Andrews, 1964). This class of situations seems to be synonymous to that which has been referred to elsewhere as problem situations (Skinner, 1953). A wide variety of human events and processes, both internal and external, have been hypothesized to occur in such situations and the resultant behaviors aimed at finding a solution have been referred to as problem-solving behaviors (D'Zurilla and Goldfried, 1968). These behaviors have been postulated to be internal in nature by some researchers and predominantly external by others. However, as Green (1965) has observed, problem solving has been much more easily talked of than investigated.

Helping students to solve real-life problems wisely has often been viewed as the central task of the guidance movement in American education. Though authors in the guidance literature most often refer to decision making as the process of concern, the process they describe more closely resembles what has been designated elsewhere as problem solving. Indeed, this decision-making or problem-solving orientation has been proposed as the framework for an entire guidance program within a school district (Gelatt and Varenhorst, 1968). One of the main goals of the guidance movement in America, and perhaps of the American educational system generally, is to develop the personal problem-solving abilities of its clients (Rothney, 1958; Gelatt, 1962). The increased interest in and support given to the guidance movement in this country

has paralleled the increasing complexity of the problems facing each individual. Such problems involve decisions that were once relatively simple (e.g., choice of an occupation) but are now quite complicated, and new decisions which must be confronted (e.g., use of increased leisure time). Further, the new problems and increased complexity of problems previously present must be faced by an increased proportion of the population as life lengthens, citizenship responsibilities increase, and technology and change flourish (Wrenn, 1962). It seems generally agreed that the training of individuals to solve personal problems wisely is of utmost importance due to the adverse consequences befalling those with inadequate skills in this area.

It is possible that a substantial proportion of our present population could be called inadequate problem solvers. That is, they either cannot exhibit the behavior necessary to find a solution to problem situations which confront them, or their solution is based on inadequate or inappropriate problem-solving skills. For example, many anti-social acts may be problem "solutions" resulting from the use of inadequate problem-solving behaviors. Lack of the capability to perform the behaviors required in problem situations invariably leads to ineffective behavior (D'Zurilla and Goldfried, 1968).

Perhaps one barrier facing many individuals characterized as deprived or disadvantaged (Passow, 1966) may be their lack of a behavioral repertoire which could be used to deal effectively with the problems they confront in their personal lives. Coleman (1966) has pointed out that the disadvantaged see little hope for their future for it appears to them that they can exert no control over their lives. Such individuals are continually "acted upon" by their environment, rather than being agents

acting upon and interacting with their environment. Thus, without possessing the necessary behaviors with which to solve problems and make decisions, their freedom is constricted and their vision of life becomes distorted. As the possible ramifications of possessing inadequate problem-solving behaviors are examined, it is understandable that assisting individuals in learning how to solve problems wisely has been advocated as a priority goal for the guidance profession (Krumboltz, 1967). The broad purpose of the theory and research described in this chapter is to further the attainment of that goal. The initial step in undertaking such a course is to gain historical perspective of, and to profit from, past research and previous descriptions of the phenomena of human problem solving.

There is substantial overlap in the usage of the terms "problem solving" and "decision making," particularly within guidance-related literature. Often they are used synonymously. Much of this terminological confusion has arisen somewhat indirectly from the diverse research traditions and historical conceptualizations of problem-solving phenomena. Brim (1962) distinguished between the two when he asserted that problem solving more often referred to contrived, artificial, laboratory tasks, whereas decision making focused more on real-life situations. There is considerable truth to this statement, but a more useful clarification was attempted by D'Zurilla and Goldfried (1968) when they designated decision making as a major step in the process of problem solving. This position was supported by Gagne (1959) and has been adopted in this report. Thus, decision making involved some but not all problem-solving behaviors. When other authors have used the term decision making to indicate something akin to what herein has been defined as the problem-solving

process, the liberty has been taken of replacing the term decision making with the term "problem solving" throughout this report.

Historical Trends of Problem-Solving Research

Though until the late 1950's only a few research workers expended consistent efforts on the study of problem-solving phenomena, problem-solving research has had several distinguishable and notable strands running through the history of psychological research. Forehand (1965) has outlined four such research traditions and a brief examination of them provides part of the background necessary for understanding the theoretical position and strategy of the research reported here.

Gestalt Psychology. Perhaps the earliest approach to problem-solving research grew out of a legacy of classical Gestalt psychology. The conception of problem-solving phenomena espoused by this school of thought revolved around analysis of internal processes. Such researchers as Kohler (1925) and Wertheimer (1945) viewed problem solving as an integration of responses which the human had previously learned and they believed that the process often culminated in a seemingly sudden insight experience. Having relatively little to say regarding the specific process or the organizational structure of learning, Gestalt research on problem solving became primarily research concerned with supporting the notion of insight. In fact, as Forehand (1965) has pointed out, the postulate that human problem solving was a holistic process or single entity, which was the guiding light of Gestalt research, almost by definition prevented the detailed analysis of problem-solving phenomena. In addition, though S-R mechanisms were rejected by Gestalt psychology, they

offered little to supplant them. What actually went on inside the individual prior to the insight experience was never explained. In spite of the trend, a number of the more contemporary research efforts have attempted to analyze seriously such previously unanalyzed concepts as insight and fixations while, in general, retaining the holistic orientation characteristic of Gestalt thought. Representative efforts of such research are to be found in the volume edited by Scheerer (1964).

The Gestalt research tradition has highlighted the complexity of human problem-solving phenomena and has led to research which was extremely valuable in stimulating the development of opposing theories and in encouraging additional research with diverse theoretical points of view. But in focusing on insight, and in describing problem solving almost as an unanalyzable art, the Gestalt school has not been particularly helpful in fully describing the phenomena, in explaining individual differences in problem-solving behavior, and in indicating ways in which individuals could be assisted or trained to be effective personal problem solvers. Additionally, most of the problems with which it dealt were laboratory perceptual problems in contrast to less restricted personal problems arising in daily life.

Psychometrics. Psychometrics played a predominant role in the second major thread in problem-solving research. The attempt to comprehend the nature of intelligence through discovering and understanding the components of mental ability has resulted in the formation of theoretical constructs known as ability factors, mental abilities, and the like. Forehand (1965) asserted that such constructs were in reality derivations from the statistical relationships among the products of problem-solving processes. Regardless of the validity of this conceptualization, related

research, while having much to say regarding an individual's traits and qualities, sheds little light on the nature of actual problem-solving processes or the necessary conditions for successful problem solving. Nevertheless, if such ability factors could be operationalized and interrelationships clarified and if these factors could be shown to be trainable and directly connected to improved problem-solving behaviors, then the psychometric orientation could be of much greater value. This comment supports authorities such as Guilford (1961) and Green (1964) who have suggested that the forte of the psychometric approach (i.e., measurement) be combined with the techniques and concepts of other schools of thought and subsequently brought to bear upon the phenomena of problem solving. It seems clear that the preciseness and systemization of measurement demanded by psychometrics is essential for determining what actually occurs in human problem solving and for demonstrating that effective problem-solving behaviors have been learned once a training program has been developed.

Learning Research. Often characterized by a distrust for mentalism and internal entities not possessing external referents, research in human learning has spurred most of the problem-solving research emphasizing the importance of stimulus and response concepts in explaining problem-solving phenomena. The research and theory growing out of this historical tradition have taken two directions. One position, which could be regarded as an extreme version of stimulus-response formulations, has been referred to as S-R psychology. Problem solving has been viewed by researchers of this position as being adequately explained by an intense examination of the relationships between the stimuli and responses occurring in problem situations. Though many psychologists outside this position refer to

problem solving as a complex phenomenon, strict S-R researchers tend more toward a view of problem solving which portrays the phenomenon as not significantly different from simple discrimination learning. Though elaborate mechanisms such as chaining and habit family hierarchies have been employed to analyze problem solving, it has been asserted that the same basic laws and principles of learning (e.g., classical and operant conditioning) can account for it just as easily as they can account for other learned phenomena.

Some researchers, such as Ausubel (1965), have employed a different conceptualization in investigating problem solving. This second position has been labeled as S-O-R due to the importance of "mediating responses" which have been seen by these researchers as intervening between stimuli and responses. Research with this orientation has given more credence to the role of covert activities during the problem-solving process. Anderson and Ausubel (1965), in a recent discussion of problem-solving research, have contended that in contrast to S-O-R research, most investigators of the S-R school have shown little interest in such cognitive events.

Green (1965) has cogently pointed out the inadequacy of S-R mechanisms to adequately account for all the complex events that are involved in human problem solving. It may be well that a theoretical formulation utilizing mediating variables is most adequate if one wishes to develop a comprehensive description of all overt and covert events occurring in a problem-solving context. On the other hand, the S-R approach does have appeal in relation to a training program for problem-solving behaviors. To the degree that human problem solving is a function of S-R principles such as conditioning, a host of training strategies derived from these principles might prove successful in helping individuals

to utilize optimal overt behaviors in solving personal problems.

Information-Processing Theory. Somewhat recently, a new theory of problem solving has been introduced (Newell, Simon, and Shaw, 1958). Drawing upon computer programming concepts, this theory has become known as the information-processing approach to the investigation of problem solving. The argument basic to this approach has been that computer programs can be used as theoretical models of the way in which prople process information and subsequently solve problems. This position has been extremely heuristic, leading to among other things a vast amount of computer simulation research of problem solving (e.g., research on artificial intelligence). Information-processing research has tended to exemplify the precision demanded by researchers in the psychometric tradition and the theoretical formulations of this approach have paralleled computer programs in both their clarity and specificity. Information-processing research and theory have been quite useful in explaining and studying many other phenomena of concern to psychology outside the realms of problem solving (Fiegenbaum and Feldman, 1963). Again, an elementaristic or atomistic, as opposed to a holistic, stance has been characteristic of this mode of problem-solving research and in this sense it has alliance with learning theories, although it has been concerned primarily with cognitive rather than overt events. Though information processing theorists have accepted the existence of complex cognitive events inside the individual, the learning theorists' assumption that these events obey the laws of classical and operant conditioning has been rejected.

The preponderance of research relating to these four historical

trends and dealing with human problem solving has been conducted in laboratory situations far removed from problems faced in individuals' personal daily lives. Examination of two annotated bibliographies of decision-making and problem-solving research (Wasserman and Silender, 1958, 1962) indicates several themes in such research. One theme is that the whole field of problem-solving research, as Brim, Glass, Lavin, and Goodman (1962) asserted, deals primarily with artificial and limited problems. Though such laboratory problems have some formal properties in common with life decisions, such as the fact that there exists a choice between a set of alternatives, some researchers who have been active in doing research in "laboratory problem solving" have themselves been highly hesitant to generalize the results to personal problems outside the laboratory (Tate, Stanier, and Harootunian, 1959). A second theme involves the attempts to describe decision behavior in statistical terms or in the terminology of mental activities. Literature indicative of this theme stresses the investigation of the effect of various traits or psychological-cognitive variables upon problem solving (cf. Townsend and Smith, 1964; Scodal, Ratoush, and Minas, 1959). These two themes support the conclusions of Gibby and Gibby (1967) that problem-solving abilities have been treated in a ". . . theoretical manner rather than in an experimental fashion. Only recently have initial attempts been made to define decision-making ability empirically. . ." (p. 450). There is a general lacuna in the literature in the area of real-life problem solving. More specifically, little demonstrated knowledge exists as to how to assist individuals to solve personal life problems wisely.

Preliminary Rationale. As has been intimated, all four of the psychological traditions examined have influenced development of a rationale

for this report. The position taken here rests on the assertion that the cognitive process and the overt behaviors manifested by individuals in problem-solving situations are learned. In fact, as both Skinner (1953) and Brim (1962) have observed, the problem-solving behaviors which now appear to be habitual responses on the part of individuals probably have been learned in earlier problem-solving contexts. This position does not involve a total allegiance to an elementaristic stimulus response explanation of problem-solving phenomena or to the use of such an approach in training individuals to be effective personal-problem solvers.

Green's (1965) criticisms of the use of such stimulus-response mechanisms as chaining and habit family hierarchies for totally explaining problem-solving phenomena have been cited previously. However, it may well be that theories utilizing mediating thought processes or explanations employing information-processing concepts most adequately describe what occurs particularly in the cognitive realm during the solving of a problem, or perhaps optimally, what should occur. It is asserted here that if one's primary concern is the training of effective personal problem solvers rather than an exhaustive description of the how and the why of everything that occurs inside and outside the individual in the problem-solving context, then the most useful focus to adopt is that of training overt behaviors rather than of modifying cognitive processes or events. This is not meant to imply that there is a lack of interest in these cognitive phenomena. Rather, the training of overt problem-solving behaviors is seen as a more effective and efficient strategy for improving what individuals actually do in problem situations. Such an approach contrasts with other strategies which attempt direct intervention in cognitive processes and which make the questionable assumption that such cognitive training

will also result in desirable changes in overt behaviors.

By regarding problem-solving behaviors as phenomena which can be learned or have been acquired in previous problem contexts, it can be postulated that such behaviors may be modified and improved through training and perhaps effective behaviors may be trained in a manner that would maximize their transfer to a wide variety of problem situations. This approach also infers the need for practicing desirable problem-solving behaviors in problem-related situations. Thus while no specific theory is accepted as being an adequate explanation for all problem-solving phenomena or as dictating the sole effective way to assist individuals to solve problems wisely, the rationale that has been adopted here leads to discovering the behaviors that are requisite to effective personal problem solving and to seeking strategies which might prove useful in assisting individuals to acquire and perform such behaviors. To specify requisite problem-solving behaviors, an examination of representative models or less formal descriptions of human problem solving will be conducted in order to assess what behaviors previous workers in the field have designated as being part of the problem-solving process.

Problem-Solving Models

A multitude of conceptualizations and models of problem-solving phenomena has been offered (e.g., Dewey, 1933; Polya, 1945; Simon, 1957). Such descriptions have been formulated in some cases as a result of research and in others independent of research findings. Some of the models are primarily the result of research with laboratory problem situations or speculations regarding relevant cognitive processes while

others tend toward explanations of what happens when an individual meets a real-life problem. A representative sample of both types of conceptualizations is presented on page 13 where an attempt has been made to graphically compare analagous portions of the various models.

An important insight to be gained from an examination of these problem-solving descriptions is that most are predominantly step oriented. In other words, they are stage models which represent a problem solver as progressing through a sequence of steps or stages. Newell (1965) has raised serious objections to stage models for representing human problem solving, and these objections are borne out as one attempts to relate these models to potential training programs. For example, steps may overlap in time or be unstable in the sequence within which they occur. Also, every behavior manifested by the individual cannot be unequivocally labeled as to the stage or step into which it fits. The complex recycling and simultaneous occurrence of human problem-solving events also diminish the usefulness of such models. As has proved to be the case with some stage models in developmental psychology, the omission of some stages of development or the rearrangement of stages may be experimentally induced, thus challenging some of the basic assumptions of such models. In essence then, this type of model often detracts from, rather than facilitates, the development of behavior modification programs. It seems more useful to avoid static or descriptive models of human problem solving which focus on steps or stages and to emphasize behaviors and skills (i.e., a closely interrelated group of behaviors) that are useful in effective personal problem solving.

Descriptions of human problem solving which have direct application to real life as opposed to more artificial or laboratory tasks have usually focused on vocational and educational choices. Hilton (1962) has summarized

FIGURE 1

Examples of General Process Models of Human Problem Solving

(Dewey, 1933)	(Kawin, 1957)	(Gagné, 1959)	(Brim, 1962)	(D'Zurilla and Goldfried, 1968)
Perplexity or doubt.				
Identification of a problem.	Recognition and definition of the problem.	Reception of stimulus situation.	Identification of the problem.	Orientation to the problem. Problem statement and definition.
Research for facts.	Preliminary observation and collection of information.		Obtaining necessary information.	
	Analysis of facts to see how they relate to the problem.	Concept formation or invention.		
Formulation of a possible solution.	Formation of possible solutions and evaluation of them.	Determining courses of action.	Production of possible solutions. Evaluation of such solutions.	Production of alternatives.
A testing of solutions.		Decision making.	Selection of a strategy for performance.	Decision making.
Re-analysis of the problem.				
Application of the correct solution.	Trying out the most promising solution. Checking to see how the solution works.	Verification.	Actual performance of action and revision.	Verification.
	Being ready to make changes in the problem-solving plan.			

several of these, and an examination of them is useful in order to uncover the specific skills demanded by real-life problem solving. Some of the models illustrated on page 15 are particularly difficult to analyze because many of the behaviors involved in them are implied rather than stated explicitly but they effectively avoid the rigidity and the static stages put forth by several models included on page 13. Hilton's models tend to reflect more adequately real-life problem-solving contexts and the complex inter-relationships existing between various aspects of the problem-solving process. Therefore, a graphic comparison such as that made on page 13 tends to force them into a stage format, which is inappropriate. It is apparent that most of these problem-solving models grew more or less directly out of one of the four historical approaches to problem-solving research (e.g., the Attribute-Matching model), though in some instances there is a mix of traditions that is not entirely clear (e.g., the Social Structure model).

FIGURE 2

Closely associated with the rise of psychometric tests is what Hilton labeled as the Attribute-Matching model. Emphasizing individual differences, he defined this model as suggesting that "the individual first takes an inventory of his personal attributes, then he ascertains the attributes required for successful adjustment in each of some set of occupations; and lastly he selects that occupation the requirements of which best match his attributes (Hilton, 1962, p. 291)." This model has been criticized because it overemphasizes static conditions and portrays real-life problems as one choice "point-in-time" events rather than as processes in themselves. With particular clarity Super (1957) and Ginzberg (1951) have pointed out that such static processes are not representative of vocational problem solving.

FIGURE 2

Real-Life Problem-Solving Models

Adapted from Hilton (1962)

Attribute Matching Model	Need-Reduction Model	Probable Gain Model	Social Structure Model	Complex Information Processing Model
Inventories Personal attributes	Appraises Needs		Recognizes the social structure in which one is operating and one's position in it	Too much available information to be handled by the limited capacity of a human
Ascertains attributes of jobs		Generates or is given alternatives	Judges whether or not to pay the cost for each possible decision	Faced with a set of alternatives
	Estimates degree to which each job meets needs	Specifies or gains knowledge of outcomes and probability of occurrence and costs of wrong decisions	Analyzes alternatives in the light of the value of certain outcomes	Matches each alternative's outcomes against a subjective criterion of satisfaction
Selects one alternative which best meets attributes	Selects one that best meets needs	Selects according to economic decision rules (e.g., minimax theorem)		Chooses alternative in which most outcomes are at an acceptable level on a satisfaction scale

The Need-Reduction model, associated with dynamic personality theory, suggests that individuals search for vocations which will satisfy their individual needs. The person appraises his own needs, estimates the degree to which alternative occupations fulfill these, and chooses in that light. This model often has been associated with the work of Roe (1956). Two major criticisms of this model are readily apparent. First, the concept of need is a difficult construct to define operationally and to assess reliably across subjects. In the history of psychology, needs have been identified in great quantity. Until needs are operationalized and measured in a valid and reliable manner, no real validation of this model can be accomplished. Second, from the standpoint of research design, empirical studies based on this model often tend to be confounded. For example, some investigators have speculated about the needs which a vocation fills after they know the job in which the individual is functioning. Instead of taking this approach such research should assess reliably the needs of an individual and subsequently predict the probability of his selecting particular vocations. An additional problem in this connection is the determination of just what needs a specific vocation fulfills for each individual.

Closely related to the study of economics and statistical decision theory is what Hilton has termed the Probable Gain Model. According to this model, the individual is faced with a set of alternatives, each of which has specified outcomes of particular value to the individual. For each of these outcomes, the person either knows or can estimate the probability of occurrence. Various theories such as Bayesian economic thought suggest a variety of decision rules on which to base a choice among available alternatives. For example, the minimax theorem suggests that an individual should choose the alternative which will serve to minimize his maximum possible loss

after he determines the losses and gains possible for each alternative (Marshall, 1967). Substantial difficulties arise in transferring concepts such as gain and loss function from economics to real-life personal problems. For example, if an individual chooses an inappropriate vocation, it is practically impossible to determine his cost in emotional as well as economic terms.

The Social Structure model "emphasizes the mobility provided and the limits imposed by the various social structures through which an individual's career carries him (Hilton, 1962, p. 292)." The analogy to an escalator depicting the individual as a passenger has often been used to illustrate this model. But the escalator is not an ordinary one in that it may stop, accelerate, branch into multiple lines, or detour to various positions. Decisions revolve around choosing or changing escalators (alternatives), estimating the values of certain outcomes, and judging whether or not to pay the entrance requirements of various alternatives. A person's position in society (e.g., his social class) may constrict or expand the alternatives and outcomes to him. Recently, sociologists have been concerned with formulating a sociological model of decision making which emphasizes this latter point (Camilleri and Bregar, 1967).

Yet another model offered is the Complex Information-Processing Model. This model conceptualizes a person as being faced with a myriad of available alternatives. The capacity of any individual to handle all the available information concerning a problem is limited, so the individual matches alternatives against some subjective criterion of satisfaction and subsequently seeks out an alternative having outcomes which, for the most part, fall at an acceptable level on his scale of satisfaction. Thus he does

not attempt any complete ordering of payoffs and this contrasts with what is suggested by problem-solving models closely rooted in economics and statistical theory. Nor does he try to compare various outcomes which by their very nature may not be comparable. In these ways then, this model is often seen as being in conflict with some of the economic and statistical models of decision making. As Simon (1966) observed, evidence is lacking that the processes and computations (e.g., the complete computation and ordering of possible losses and gains) really do occur in real life. That is, most individuals probably do not carry out these activities as they go about solving problems.

Specification of Problem-Solving Behaviors

A wide range of problem-solving descriptions and models has been examined in an attempt to uncover the component behaviors of an effective personal problem-solving process. While some criticisms have been made regarding most of the models examined, the focus in this section is to summarize what guidelines these models and the psychological literature in general advance regarding behaviors for which instruction might be appropriately provided in a training program for effective personal problem-solving behaviors.

Girshick (1954) in stating that "you cannot solve your problems unless you . . . clearly define your goal and the consequences of your decisions (p. 463)," specified a behavioral area found commonly among the problem-solving models examined. Most descriptions of the problem-solving process do consider the importance of identifying and clearly defining the problem situation. Additionally, most see the need for studying the consequences of various alternatives before choosing one. Several other skills or clusters of behaviors are inferred by many of the models. Finding information, separating relevant from irrelevant information, and considering such

information in light of the problem is one such behavioral cluster. Another is the production and consideration of several different tentative solutions before choosing one of them. Similarly, several models imply behaviors revolving around the selection of one of the tentative solutions to be tried out and the implementation of that solution. Such selection behaviors constitute what is herein termed the decision-making skill area. A further similarity among the models is concern shown for the maximization of what the individual has learned from going through the problem-solving process. This is manifested by the inclusion of behaviors and, in some models, complete stages, dealing with the analysis of both the outcomes of problem solving and the process which was used to arrive at a solution.

Other investigators have arrived at categorizations of important problem-solving behaviors much like those presented above. Bross (1953), for example, suggested that the decision maker must have a predictive system which assesses alternatives, outcomes, and probabilities; a clear value system which weighs outcome desirability; and a "decision criterion" which integrates information and selects a course of action. Similarly, Gelatt's (1962) study of decision theory led him to specify some of the same commonalities that have been mentioned previously but he made important additions. Gelatt placed great emphasis upon the significance of problem solvers considering the consequences of possible alternatives and taking responsibility for the decisions which are made. The maturity in problem solving suggested by these two skills presents an important conceptualization.

Even though most problem-solving models have some degree of uniqueness, there are recurring themes and major commonalities in the behaviors considered important in each model. While most of the formulations studied have been

descriptions of the total problem-solving process, considerable value can be attained by an in-depth analysis of each particular facet of the problem-solving process. Since several commonalities have been considered in the skill areas specified in these problem-solving descriptions, each skill ultimately must be operationalized into its constituent behaviors. For example, this is one of the valuable results coming from an enumeration of important problem-solving behaviors generated by Krumboltz (1966). In this case, an in-depth analysis of two major aspects of problem solving (i.e., the consideration of alternatives and decision making) was elaborated.

The behaviors included were:

Generating a list of all possible courses of action;
Gathering relevant information about each feasible alternative course of action;
Estimating the probability of success in each alternative on the basis of the experience of others and projections of current trends;
Considering the personal values which may be enhanced or diminished under each course of action;
Deliberating and weighing the facts, probable outcomes and values for each alternative;
Eliminating from consideration the least favorable courses of action;
Formulating a tentative plan of action subject to new developments and opportunities;
Generalizing the decision-making process to future problems.

Additional descriptions of how major life problems are resolved could be presented. For example, from the realm of vocational problem solving alone several more are available (cf. Ginzberg, 1951; Super, 1957; Tiedeman, 1963). Those already presented, however, form a representative sample from guidance literature and from psychological theory and research literature in general. From the preliminary specification of behaviors presented earlier and the more detailed analysis offered by Krumboltz (1966), substantial efforts have been made to operationalize the specific behaviors that might be included in a problem-solving training program.

At present, the interrelationships of problem-solving behaviors like those just cited are not known, nor can the level of specificity most useful for training be dictated. However, in an attempt to further integrate operational, and systematize problem-solving commonalities reported in the literature, the problem-solving paradigm on page 22 has been prepared. This paradigm serves as the framework upon which a comprehensive training program for problem solving will be developed. Though the behaviors are grouped into skill areas, no inference is made that these areas represent states of problem solving or an optimal sequence of responses.

FIGURE 3

PERSONAL PROBLEM-SOLVING PARADIGM

General Process Skills	Specific Problem-Solving Behaviors Grouped by Behavioral Skill Areas
A. Planning Emphasis--decision making and performance activities involved are in these problem-solving behaviors but the emphasis is upon using a planned approach to understanding the problem and gathering information on it in order to expedite subsequent problem-solving activities.	1. Perceiving, delineating, and comitting to work on, the problem. a. Perceiving a personal problem when it exists. b. Inhibiting the tendency to respond impulsively, passively, or by avoiding the problem. c. Stating the conditions that would exist if the problem were resolved. d. Specifying discrepancies between current personal status and those levels that would exist if the problem were resolved. 2. Searching for, evaluating, and utilizing the information. a. Formulating a strategy for searching for information relevant to the problem. b. Knowing and evaluating sources of information. c. Efficiently utilizing the sources of information. d. Evaluating the reliability and accuracy of information received and its relevance to the problem. e. Being willing to consider new information relevant to the problem even when it conflicts with that presently held.
B. Decision-Making Emphasis--planning and performance activities are involved in these problem-solving behaviors. Planning skills are ones which are particularly important following the decision-making activities implemented here.	3. Generating and considering multiple alternative problem solutions. a. Generating several viable courses of action or alternative solutions to the problem. b. Knowing possible outcomes associated with each alternative. c. Calculating the subjective and objective probabilities of each outcome's occurrence. d. Using some personal standards or criteria for determining the desirability of possible outcomes. e. Considering each alternative in light of the information gathered on its possible outcomes and in relation to the conditions that would exist if the problem were resolved. 4. Selecting the most desirable alternative problem solutions and formulating plans for implementing these alternatives. a. Knowing and considering various rules or philosophies for selecting an alternative problem solution. b. Selecting a preferred alternative problem solution to be implemented and knowing the rationale for the choice of this alternative. c. Selecting, and knowing the rationale for the selection of, a second alternative problem solution to be used in case certain contingencies arise thwarting implementation of the first choice alternative. d. Detailing a plan for carrying out the preferred alternative problem solution. e. Knowing some conditions under which the second alternative problem solution might be implemented.
C. Implementation Emphasis--activities here involve what has been referred to as "student managed performance." However, decision making (relative to evaluating one's problem-solving behavior) and planning (relative to revising or changing plans for implementation) are both involved in these activities.	5. Implementing specific plans related to selected alternatives. a. Until such time as other plans appear more appropriate, exhibiting the behaviors necessary to implement the plan for the chosen alternative. b. Correctly judging whether the plan of implementation should be modified, or replaced with a plan for implementing the second choice or other alternative. c. Implementing a plan for the second or other alternative as a result of information collected while acting on the preferred alternative. 6. Analyzing the process and product of problem solving. a. Ascertaining if the problem has been satisfactorily solved by comparing present conditions with those previously specified for problem solution. b. In terms of the model presented here, analyzing the positive and negative aspects of the behaviors emitted during the problem-solving process. c. In terms of the previously specified conditions for problem solution, analyzing the positive and negative aspects of the solution and the results of the problem-solving process. d. Knowing what has been learned (i.e., principles and techniques) that will be of help in future problem contexts. e. Applying these principles and techniques to future problems when appropriate.

Attempts to Train Problem-Solving Behaviors.

Programmatic Efforts. During recent years, several self-contained packages which attempt to assist students in making decisions wisely have been developed (Katz, 1961; Yabroff, 1966; Wilson, 1967; Loughary, et al., 1967; and Magoon, 1966). These largely overlap one another and can be examined as a group. They are predominantly product, not process oriented since it is the answer to the problem, or the decision made, not the skills employed in arriving at the solution that has been emphasized. They have been classified here as attempts to train problem-solving behaviors even though, perhaps due to their preoccupation with acceptable solutions, the specific behaviors that are being trained must be inferred since these behaviors are not stated explicitly. The effects of these programs are largely untested, at least in terms of published reports. Little information is available on whether or not each student's behaviors have changed after he has been exposed to the programs. Some self-report data on student reactions is available and Katz's program did undergo at least one evaluation study without any control group (Gribbons, 1960). However, to my knowledge these programs have never received a formal research test of their effectiveness through experimentally-controlled investigations. It is not known if students who experienced these programs now make decisions differently in their own lives.

All of the programs are geared toward educational and vocational problems with most focusing on post high school educational plans (e.g., choosing one type of college or planning a high school program). Thus, a very narrow range of decisions are approached though Wilson (1967) does discuss decision making in general and Katz (1961) implies the usefulness of the process in other areas of life. Most of the emphasis

given to the problem-solving process process appears to be on information-gathering skills and on the skill of assessing the probability of success based on the experience of others. Students are involved in actually carrying out a few tasks (e.g., filling out next year's high school program) but no coordinated sequence of practice on the various skills of problem solving is provided.

In spite of their limitations, these programs are important for they deal with personal life decisions, they are written for the most part in language understandable to students, there is at least the foreshadowing of a possible transfer of behaviors to other life areas, and they involve ideas and concepts that are important in solving human problems. However, there exists no training program which specifies the necessary behaviors and skills for solving personal problems wisely, which systematically trains such behaviors, and which evaluates the effectiveness of the training.

Most of the foregoing comments apply to a program employing a somewhat different approach which has been developed over a ten-year period at Union College by Ligon (1968) and his associates. This program is discussed here separately for a number of reasons. First, it exposes students to a large amount of data gathered from other students through questionnaires and similar devices. The purpose of these data seems to be an attempt to assist students to see both their similarities and differences in relation to other young people. This kind of cognitive consideration of data is characteristic of the rather philosophical orientation evident throughout this program. A "religious humanism"

pervades the materials, and the program seems to aim at assisting students in the processes of becoming, of developing their identities and their potentialities. Second, the organization of this program's materials is rather different. These materials involve a series of short units of instruction, each outlining a technique (e.g., projective mirror technique, estimating probabilities) considered helpful in making wise decisions. Each unit recommends activities designed to help the student use these techniques in his own life. Most of the units deal with the problem-solving skills of gathering and analyzing data but the organization of these skills into an integrated training program is not undertaken and each section apparently has to stand quasi-independently. Though the materials seem adaptable to group use, they are primarily self-instructional. Unquestionably, there are good features incorporated in these materials. Exposure to the thoughts of a wide variety of other young people is desirable as is the emphasis on specific behaviors. However, many of the techniques are highly introspective and cognitive in nature; clear training objectives, related criterion measures and a rationale are lacking; and no cohesive organizational pattern is presented.

Recently, D'Zurilla and Goldfried (1968) and Goldfried and D'Zurilla (1969) reported the initiation of work on a comprehensive training program. Concerned with the general goal of bringing about effective behavior in college freshmen encountering problematic situations, they are focusing their attention on cognitive operations even though they acknowledged that such operations may not have any corresponding

overt behavioral correlates. The ultimate goal of these investigators is to train individuals in effective cognitive mediational operations related to problem solving. The population for whom their training program is being developed (i.e., male college freshmen) has served as the prime source of the data which will determine the program's content. Descriptive information on typical day-to-day problems faced by male freshmen and the ways in which students respond to such situations has been collected.

Focusing on those problems with widest application among the population to be trained, "experts" from the environment of the students have been selected to judge the effectiveness of the various alternative responses to each problem situation. Once standardized realistic problems have been identified and the relative effectiveness of alternative solutions for each problem has been determined, training for "effective" behavior, as the authors refer to it, will be ready to begin. At present, several possible strategies have been posited for training, but none has been definitely decided upon. It appears, however, that the training will be primarily cognitive rather than behavioral in nature. The importance of this evolving program lies partly in its approach of seeking out a variety of problematic situations with which the target population is actually faced. Further, the individuals selected for training are being assessed as to how effective their behavior is in these problematic situations. Lastly, an imaginative variety of techniques including discussions, role playing, behavioral rehearsal, and programmed texts is being considered for training purposes. Additionally, evaluation procedures based on the objectives of the program are being planned. Such features combine to make this

program unique and exemplary when it is contrasted with others reported in guidance-related literature.

Perhaps the finest programmatic work in the training of problem solvers comes from the highly specialized field of tactical tasks. These are war strategy tasks in which an individual using available information about the enemy must make decisions which minimize negative outcomes to the men and equipment with whose care the individual is charged. Using Bayesian rules for optimal decisions, Sidorsky and Mara (1968) engaged in research aimed at identifying the specific skills needed in a war strategy decision situation. However, research studies like this which attempt to train specific behaviors or skills necessary for effective problem solving are rare indeed. Due to the vast difference in the tasks involved and the context in which they are performed, their findings can only be roughly converted to the realm of real-life personal problems.

Thus, the studies which attempt to teach specific problem-solving behaviors are primarily in the realm of laboratory and tactical tasks. D'Zurilla and Goldfried's initial efforts notwithstanding, no comprehensive programs currently are available which attempt to train individuals to solve real-life problems wisely.

Individual Investigations. There exist several scattered research studies dealing with the development of particular problem-solving behaviors and these studies produce clues to useful training strategies and to factors having influence on real-life problem solving processes. One behavior receiving attention has been the generation of alternatives of multiple solutions to problems. Maltzman (1960) and Mednick (1962) have stated that one barrier to developing this ability is a large amount of associative strength built up to a

particular stimulus. That is, in a situation where the subject may respond in a number of different ways, one potential response is, because of past experience, so strongly associated with the stimulus situation that it emerges almost automatically leaving other possible responses little chance of competing with it. Maltzman, Bogartz, and Bregar (1958) manipulated the associative strength of one response to a stimulus by repeatedly presenting the same stimulus while encouraging and reinforcing new responses by the subject to this stimulus. They discovered changes in the ability of their subjects to produce alternative responses and found that this newly gained capability of producing many different responses to the same recurring stimulus carried over to a highly unrelated task. The production of several different responses to a recurrent stimulus has been labeled as originality by some researchers. Citing the work of Maltzman (1960) and Maltzman, Bogartz and Bregar (1958), Sieber and Lanzetta (1966) concluded that "originality learning, apparently like other operant learning, takes place when the desired response is repeatedly elicited and reinforced, and the originality thus learned persists for a time after training (p.562)." From these studies it can be inferred that behaviors viewed in this report as being desirable in the problem-solving process can be modified experimentally, that reinforcement techniques may be of potential use in bringing about such modifications, and that under optimal training conditions newly acquired problem-solving behaviors can be transferred to other unrelated but appropriate situations.

Related research (Wilson, Guilford, and Christensen, 1953; Johnson and Zerbolio, 1964) has used the plot-title problem in which the subjects were provided with a written summary of a story plot and requested to supply several

possible titles. Using this and several similar problems, Johnson, Parrott, and Stratton (1967) devised treatment conditions consisting of several different sets of introductory instructions. One group was told to write a solution to each problem; a second, to produce as many solutions as possible in a given time limit; and a third, to produce several solutions and later to indicate their best one. However, even though such instructions produced differences among groups in the number of responses given to the stimulus, subjects in each group did not differ significantly in their ability to judge the quality of their own responses. That is, even though some subjects could generate many alternatives, their ability to judge the quality of their alternatives was not superior to that of other subjects. One is thus cautioned to refrain from lending too much inportance to a rather simple problem-solving behavior (e.g., generating alternatives). It may be far more important for individuals to learn what behaviors to perform, such as being able to judge between a good and a poor alternative solution, once they are given alternative problem solutions, than it is for them simply to be able to generate many alternative solutions or to acknowledge the existence of several alternatives when they are provided.

Some additional studies designed to increase particular behaviors associated with human problem solving are relevant here. Through the use of programmed materials, Blank and Covington (1965) increased question-asking behaviors among sixth graders on science problems. Children exposed to these materials were rated as being more skilled in class discussions as well. Baker and Krumboltz (1968); Nelson and Krumboltz (1967) and Krumboltz, Sheppard, Jones, Johnson, and Baker (1967) designed kits simulating the problems workers encountered on the job in various occupations. Some evidence showed that such experiences did increase the amount and diversity

of secondary school students' information-seeking behaviors relevant to vocational problem solving. Sheppard (1967) developed a booklet utilizing a problem-solving paradigm in which each student acted as a vocational detective appraising his own characteristics and learning information about vocational opportunities. This device was found in some instances to stimulate even more vocational information-seeking behavior than that produced by one of the simulated career kits mentioned earlier (Nelson and Krumboltz, 1969).

Using reinforcement techniques in counselor interviews, Ryan and Krumboltz (1964) increased the number of verbal statements indicative of deliberation about a decision and the number of statements indicating conclusions about a decision had been reached. This modified behavior was reported to have generalized to a non-counseling setting.

A fascinating study focusing on the alternatives faced by individuals in a real-life problem situation was carried out by Hendrick, Mills, and Kiesler (1968). When several stimulus characteristics were designated as relevant in the selection of a necktie, decision time when four alternatives of roughly equal attractiveness were available was significantly shorter than when two highly attractive and two rather unattractive alternatives were available. However, when only one stimulus characteristic of the alternatives was made a relevant factor in the choice, the outcome was reversed (i.e., decision time was longer when four equally attractive alternatives were available than when there were two attractive and two unattractive alternatives). Thus the complexity as well as the number of alternatives in the problem context must be of concern. Lowe and Steiner (1968) discovered that subjects' perceptions of whether or not pending decisions could be reversed, and whether or not consequences could be changed based

on subsequent behavior, resulted in differential preferences for information on alternatives, the desire for comparable information on each alternative, and the desire for information consonant with the subjects' expressed decision.

One hundred and twelve female undergraduates who expressed a willingness to accept a blind date were divided into four groups by manipulating the instructions provided to them. Subsequent to the presentation of photographs and informational descriptions of two young men, half the girls were informed that a date would be arranged with the young man of their choice, whereas the remainder of the girls were instructed to simply select the man they thought would be the best date. Furthermore, within each of these two groups, half the girls were informed that they could later reverse their decisions after receiving more information about the men and the remainder of the girls were told that the decision they were making was irreversible, even though they could obtain additional information concerning the men. After each subject announced an oral decision, and rated each of the men along a 23-step graphic scale, each girl was allowed to read statements which they were told had come from girls who had dated the men. Four pages of such comments, one favorable and one unfavorable for each man, were available. Each subject at this point was asked to express a preference for which of the four pages of comments she wished to read and rated their interest in reading each of the pages along 23-point graphic scales. The experimenter next informed each subject that the particular investigation being conducted permitted the reading of only particular pages of comments irrespective of the preferences the subject had expressed. All subjects were given identical comments unfavorable to the man they had chosen,

and comments favorable toward the man whom they had not chosen. Finally, after a two-minute perusal of these comments, each subject again rated the two potential dates with the girls assigned to the reversible decision group being told that a date would be arranged with the man she rated higher the second time, and the girls in the irreversible decision group being informed that a date would be arranged with their original choice. Among the findings, it was noted that individuals who believed that their decisions would have no important consequences were more likely to favor receiving information which agreed with their choice than were individuals who believed that their decision would have important consequences. Additionally, people who had made reversible decisions tended to desire a greater quantity of information and more comparable information about each of the two alternatives than did subjects who perceived their decisions as being irreversible. Favorable information was in general favored by subjects over unfavorable information.

The preceding two studies are extremely important because they deal with concepts that are often talked about in problem-solving literature but rarely researched. The Lowe and Steiner (1968) study indicates that the consequences of a subject's subsequent behavior as perceived by that subject and the potential reversibility of a choice affect his preferences for various kinds of information concerning alternative solutions to a problem. Lowe and Steiner assert that there are several patterns of information preference that should be investigated in addition to the rather common dimension of consonant versue dissonant information. If the seeking of substantial amounts of information on alternatives and the phenomenon of openness to information conflicting with an individual's decisions are to be encouraged, then subjects must be in

possession of information about the consequences of future behavior and the reversibility of a particular decision. The investigation carried out by Hendrick, Mills, and Kiesler (1968) provides insight into the effect two types of alternative solution contexts have upon problem-solving behavior and suggests that much more must be learned about the parameters of the problem on which the subject is working and that decision time is not always a clear or useful criterion by which to judge effective problem solving.

Also related to the possible consequences of choosing an alternative solution to a problem, Walster (1967) found that second guessing increased when consequences were highly important. Second guessing is the tendency to adjust a prediction or judgement previously made to allign with reality subsequent to the original judgement. For example, having predicted the occurrance of event A, the individual, after event B actually occurs, confidently announces he had really expected B all along. Walster reported two experiments from which she concluded that the more extreme an actual outcome, the more confident subjects were that they expected that outcome. Secondary school students (N = 153) were asked to read background information about an individual, listen to an audio-taped interview with the individual, and subsequently respond to questions regarding their impression of that individual. Through manipulating the information available to the subjects, seven experimental groups were formed. Though all groups received information regarding the individual's background and concerning a major decision being contemplated (the purchase of a house), three groups were informed that the outcome of the decision was a financial loss, and three groups were told that a financial gain resulted (either extremely large, somewhat large, or slight, depending upon the treatment

condition). A no information group did not know the outcome of the decision. The second study reported, though undertaken with university undergraduates and using different materials, was in principle the same. In both cases, responses on a seven-point scale (+3 to -3) indicated that a linear relationship existed between the extremity of the actual outcome and the degree of confidence that subjects manifested that they would indeed have anticipated the outcome and acted accordingly. True, this investigation may be criticized on the grounds that the phenomena investigated was not second guessing in the full sense. That is, no measure was taken prior to learning the outcome of the decision and subsequently compared with a second judgement after learning the outcome. However, the possibility is raised that learning of or perhaps even experiencing extreme outcomes may maintain or perhaps even increase the confidence of an individual that he indeed would have, on second thought, anticipated the actual outcome of the decision.

If indeed it is desired to increase the accuracy with which an individual anticipates outcomes, it may therefore be unwise to overemphasize the consequences of an impending decision for by so doing, an increased confidence in the subject's ability to correctly anticipate consequences may result when such an increase is not warranted.

In an attempt to teach eighth-grade students a decision-making strategy, Evans and Cody (1969) employed a variety of treatments including cueing and prompting in addition to video and audio-tape modeling with one group, reflection of student statements with a second group, and no instruction whatsoever with a third group. The behaviors which were to be encouraged by the training included giving consideration to the consequences of each alternative course of action and judging the desirability

of these consequences. The major criterion of training effectiveness involved having a three-member panel, including one of the experimenters who had trained the students, judge the incidents of student references to the desired behaviors as students went about solving standardized criterion problems. The fact that one of the experimenters was included on this panel of judges, in spite of the authors' claim that having other panel members would eliminate this bias, and the fact that the post-training criteria were administered within minutes after the training was completed, weakens this criterion measure. The guided group which received the modeling experiences along with experimenter prompts and cues performed significantly better on this criterion measure than did either of the remaining groups. This group maintained its superiority in performance when an additional criterion problem was administered 13 days later. While this investigation provides strong evidence that problem-solving behaviors (at least covert ones) can be taught to students, the treatment group scoring highest received so many training techniques and experiences that it is impossible to ascertain the effect of the different components involved in the training. Further, all that is known from this study is that a group given all sorts of help performs better than an active or an inactive control group. A greater number of groups employing divergent strategies should have been included. The results of this investigation are still helpful, however, since they suggest variations of potentially useful training strategies such as video and audio-tape modeling and they give some credence to the possible transfer effects of training programs.

Summary Implications for Training. The programmatic efforts to train problem-solving behaviors appear to be particularly disappointing in terms of clear objectives, specific training procedures, and well designed evaluation procedures which are tied to predetermined training objectives and which would demonstrate these programs' effectiveness in terms of overt student behaviors. The focus of many of the packages seems to be upon the decision made, rather than upon the skills or particular behaviors required to make it. In addition, these programs deal with a rather narrow range of problems and do not emphasize the transfer of what is learned to future problem situations. While lacking the packaging and more comprehensive framework of most of the programmatic efforts, many of the specific research investigations make more specific efforts to define the behaviors that are being trained and give great and frequently imaginative emphasis to assessing the effectiveness of the training procedures.

A review of attempts to train problem-solving behaviors supports the notion that a wide variety of behaviors can be taught successfully to students at many age levels, although it also suggests that too much focus has been placed on covert behaviors verbalized in the forms of opinions, knowledge, and attitudes. All of the training-relevant literature reviewed documents the need for precise operationalization of specific problem-solving behaviors, clear objectives related to these behaviors, precise measurement of such behaviors, and methods for training which maximize the positive transfer of behaviors thus acquired. Variations of several training procedures of potential value have been suggested by this review including reinforcement, video and audio-modeling (accompanied by cueing and

prompting), group discussions, behavior rehearsal, and verbal instructions. All the possible training strategies have not been thoroughly investigated and those findings that exist have not been systematically replicated or incorporated into training programs.

While past research provides direction and hypotheses for further investigation, it seems clear that progress toward a program of proven effectiveness in assisting young people to become effective personal problem solvers is quite inadequate. Several reasons for this inadequacy can be hypothesized in addition to those implied by the foregoing review of research. Washburne and Darmsball (1967) have suggested that a fundamental problem in studying decision making lies in the possibility that it involves different kinds, rather than a single kind, of covert and overt behavioral processes. Means (1966) extended this statement beyond a consideration of decision making when she concluded from her work in problem solving that several skills are involved and that they are not all dependent on one another. Additionally, the apparent complexity and individuality of personal-life problems may inhibit investigators from initiating attempts to specify and train problem-solving skills. Whatever differentiates those who solve problems wisely from those who do not may appear to be almost mystical in nature or specific to the individual or the situation. In contrast to personal-life problematic situations, it is also obvious that contrived laboratory problem-solving tasks lend themselves much more easily to the control of variables and to mathematical analysis.

Measuring Human Problem-Solving Behaviors

Two major requisites for the development of a comprehensive training program for personal problem solving have been discussed: specification of problem-solving behaviors and delineation of appropriate

training strategies. Of similar importance is the construction of reliable and valid criterion instruments for assessing individuals' acquisition and performance of such behaviors. At this point a problem closely allied to that of measurement demands examination. Considerable controversy has developed over whether the focal point of problem-solving training should be the process or the product of that process. Bross (1953) has suggested that the criterion for judging good or bad problem solving is pragmatic (i.e., What is the outcome of the decision? Did it work?). Leaning more in the direction of a process orientation, Gelatt (1962) stated that a good decision is one in which the decider has considered the alternatives and is willing to accept the consequences of his decisions. Halpern (1968) has made a cogent case for examining problem solving in terms of is process. Using the problem of vocational selection as an example, he suggested that:

> Outcomes . . . are always a multiple function of the decision itself, the implementation effort and the milieu in which these occur. Contingencies . . . may drastically affect the probabilities of specific outcomes, yet the individual has little or no control over them. The preference for a process focus does not rest merely on the rejection of outcomes, however. Processes are preferred because that is what education is all about--the acquisition of coping mechanisms. (p. 3)

Since it is hoped that in an effective problem-solving training program the productive and desirable outcomes of problem solving will be maximized and that subjects will be able to pick the most appropriate courses of action in problem situations, it is not necessary to pledge allegiance to either side of the controversy discussed above. An equally valid reason for espousing the importance of both process and product in effective personal problem solving is that, due to a commitment expressed herein to precise and valid measurement of the behaviors under investigation, criterion measures of problem-solving effectiveness will always include assessment

of both process behaviors and the product of such behaviors.

An additional piece of reasoning supports the even handed emphasis upon both process and product measures in measuring problem-solving behaviors. The validity of the process itself comes partly at least from desirable outcomes accruing to those using it. If people in reality do not experience more satisfactory outcomes and a greater probability of success in achieving their objectives through using a problem-solving process postulated to be effective, then that process must be modified or discarded. At the present, a substantial part of the evidence supporting both the need for a problem-solving training program and undergirding the choice as to just which behaviors are included in an effective problem-solving process is inferential and anecdotal. This unsatisfactory state of affairs will continue until improvements are made in the measurement of personal problem-solving behaviors and in the systematic researching of the effects of alternative training techniques.

The controversy discussed above points up a major difficulty in problem-solving research; the development of adequate instruments for accurate assessment of personal problem-solving behaviors. A survey was conducted for devices which attempt to measure the nature and occurrence of problem-solving behaviors and the outcomes to which these behaviors lead. Only three instruments were uncovered which purport to deal with real-life problems and all were concerned with behaviors postulated to be of use in solving problems wisely. Brief summaries of these instruments follow.

Townsend-Smith's Test of Decision Making Ability. Townsend and Smith (1964) developed a test designed to assess behavior in three content areas: risk situations, conditions of uncertainty, and conditions of certainty. In the first area, risk conditions, betting propositions were used. The rule for solving such problems in the optimal way was for the individual to choose that alternative which maximized his payoff. Matrices which contained alternative probabilities of winning, various value bets, and varying payoffs in case of a win were presented as problem situations to the subject. Solutions to 16 of these matrix situations were scored as good, fair, or foolish. A good bet yielded twice the payoff of a fair bet, while a foolish bet yielded only one-half the payoff of a fair bet. A fair bet was a combination of value bet and probability of success and yielded a result in which the subject neither gained nor lost.

A second section of this test consisted of a 49-item multiple-choice test. Again the examinee selected alternatives, but in this case the principles, purported to be optimal in choosing solutions under conditions of uncertainty, were represented by seven items. Answers to the items were judged to be correct solutions if they were consistent with the appropriate problem-solving principle specified by the examiner.

The final section of the test presented problem situations which were solved under conditions of certainty (i.e., the choice led invariably to the goal). Life situations were presented which placed the subject in conflict with a commonly accepted cultural value. He responded by saying what the hypothetical person should do, and what he himself would do in the same situation. High scores resulted when the subject knew

what was expected by the culture and acted in accordance with those values.

This paper-and-pencil test, therefore, dealt with three types of problem situations categorized on the basis of risk conditions. Solutions were judged as good by the degree to which they were consistent with specified rules of selection. Such an instrument would be important for determining an individual's knowledge of various principles for selecting an alternative problem solution, but it would not assess the performance of the actual behaviors involved in solving a personal problem. Some of the problems used were rather artificial and quite unlike real-life problems. The final section of the test may, in reality, have been a personality test measuring conformity or some other psychological construct. In addition, the test elicited responses which were not, and might not closely correlate with, the actual actions taken by subjects in the situations described.

Dilley's Decision-Making Index. Dilley (1965) developed the Decision-Making Index in which each subject was presented with several life problem situations and a set of six alternatives for each situation. The subject was asked to state two possible consequences of each alternative solution and then for each of two outcomes to rate along five-point scales each alternative's desirability and probability of occurrence. For each problem situation, the six alternatives outlined were then rated in the order they would be chosen. Dilley took the position that the "best" solution consisted of the one which had the highest utility for the problem solver. Thus, in

evaluating a solution chosen in any of the problem situations, he multiplied its desirability rating by the probability rating for each of the two outcomes related to that alternative. The results were subsequently added to yield a utility value for each alternative. It was then determined whether or not the individual selected the alternative having the highest utility value for him. (Apparently Dilley was interested primarily in the product of the problem-solving process.) Scores on this instrument have been found to be associated with high intelligence, high achievement in high school, and extensive participation in high school extra-curricular activities.

Halpern's Case Development Questionnaire. Halpern (1967) introduced an instrument which focused on the nature of the information-search behaviors prior to selection of a problem solution. A simulation situation was used to determine the particular information which was selected by the problem solver and the sources from which the items of information were selected. For example, a curriculum choice was to be made for a fictitious student. The subject was asked to select items of information and to arrive at a solution to the problem. From a table of 24 cells which represent combinations of four information areas (e.g., what the course prerequisites are) and six sources (e.g., a counselor) the six cells deemed by the subject to be "most important" and "least important" to the solution to the problem were requested. Subsequently, the subject selected seven cards in a series from which he chose his solution to the problem. Five scores derived from the instrument included: coverage, which indicated how many of the sources and information areas were selected; consistency, which indicated the variability of the selection pattern; efficiency, in which a counselor evaluated the appropriateness of the selections; flexibility, which reflected the rigidity of the choices; and congruence, which revealed the effect of initial

information selections on subsequent selections. No extended explanation of the derivation or meaning of these scores was given. With this instrument Halpern probed the information-gathering aspect of the problem-solving process in order to assess the individual's problem-solving effectiveness.

Three major attempts at the measurement of problem-solving behaviors have been explained briefly because of their possible relevance for the development of a training program for problem-solving behaviors. They were studied in the hope that they would provide valuable clues to the development of valid criterion instruments for assessing problem-solving behaviors. Several weaknesses in these devices led to the decision that new criterion instruments needed to be developed.

Two of the instruments have as their prime concern each subject's answer to the problem, and do not emphasize assessment of the problem-solving behaviors emitted to that point. A subject simply needs to know the rule or principle by which to choose solutions. The Decision-Making Index gives only passing consideration to the specification of possible outcomes and to their desirabilities and probabilities of occurrence. However, it requires that the subject actually go through, at least on paper, some problem-solving behaviors (e.g., calculations of the likelihood of outcomes) something which does not occur in the Townsend-Smith instrument. Only Halpern's assessment technique gives emphasis to behaviors emitted prior to the solution, and only this device approaches the measurement of problem-solving behaviors in a situational context as opposed to having each subject react only to contrived paper-and-pencil situations. None of these three instruments evaluates each subject's performance of desirable problem-solving behaviors emitted while the subject deals with his or her own life problems.

From the review of criterion instruments, it was concluded that it was desirable to specify more precisely the problem-solving behaviors being measured, more closely to approximate real-life problem settings when measuring such behaviors, and to move in the direction of making provision for dealing with a subject's own real-life problems. The study of these three instruments led to a belief that problem-solving behaviors in at least simulated life situations can be measured if such behaviors are first specified operationally. It was postulated that the development of a comprehensive training program for problem-solving behaviors would make it feasible to manipulate various "givens" in the problem situation in order to assess both the performance of process behaviors and the effectiveness of the final solution. Unless some type of simulation or real-life procedure was used as an assessment strategy, it was felt that it would be impossible to get a realistic assessment of either the process or the product of problem-solving behaviors dealing with real-life, personal problems.

Suggested Comprehensive Research Program

To continue the progress toward the goal of improving individuals' ability to solve personal problems wisely, it would seem desirable to undertake development of a training program which contains many of the assets possessed by the programmatic efforts reviewed earlier (e.g., professional packaging) while retaining the methodological precision and evidence of effectiveness demonstrated by many of the research studies reviewed. This training program must therefore be the result of substantial research which continues to specify the component behaviors of effective personal problem solving and to formulate training objectives stated in terms of student performance outcomes. Additionally, the interrelationships of the behaviors to be trained must be investigated in order

that the optimal training sequence might be formulated. These tasks of clearly specifying the behaviors to be acquired along with their interrelationships and then arranging them in the most appropriate sequence for learning have been identified as being of prime importance in any training approach (Gagné, 1965).

Subsequently, alternate strategies must be explored for training the problem-solving behaviors that are identified. It might be found that effectiveness of a particular strategy will vary according to learner characteristics or to the nature of the specific behavior being trained. Hopefully, the ultimate result will be that an optimum strategy needed to develop any particular problem-solving behavior could be matched with relevant learner characteristics. Through such research, decision rules might be formulated for prescribing training experiences tailored to each individuals needs and characteristics.

Initial Investigation

The research reported here is an initial attempt to implement the research program outlined above. Its prime purposes were to explore the effect of a number of promising training strategies aimed at producing specified problem-solving behaviors, and to investigate the possible effects of one learner characteristic (i.e., subject sex) upon various treatment strategies. Though preceding research has not indicated all factors necessary for successful training programs, three areas of educational and psychological research were studied to derive suggestions for the development of promising training strategies which might be evaluated in this pilot investigation.

Social Modeling. From the research in social learning (cf. Bandura and Walters, 1963) one training rationale was developed. Bandura and his associates demonstrated the observation of models can have a substantial influence in changing an observer's behavior (Bandura and McDonald, 1963). Subjects acquired modeled responses regardless of the consequences befalling the model (Bandura, 1965a) but observers' performances of the acquired responses were highly affected by the experimenter's positively reinforcing the model's performance. Learning which thus takes place without subjects actually performing the behavior during the learning period has been referred to as "vicarious" or "no-trial" learning (Bandura 1965b). Bandura (1965a, 1969) reported that a wide variety of behaviors can be modeled and imitated.

Furthermore, the characteristics of social models have been investigated and found to influence observer behavior. Among model characteristics found to be influential have been age (Marston, 1965), competence (Bandura and Kupers, 1964), credibility (Rosenbaum and Tucker, 1962), power (Mischel and Grusec, 1966), prestige (Asch, 1948), sex (Thoresen, Krumboltz and Varenhorst, 1967), status (Lefkowitz, Blake, and Mouton, 1955), and ethnic group (Epstein, 1966). However, the specific procedures by which these characteristics promote imitation of various types of performance have not yet been made clear.

Participation and Reinforcement. Lumsdaine (1961) concluded that learning approaches which foster active response in the subjects are generally found to be more effective than procedures not containing such an element. Though dealing predominantly with subject matter recalled subsequent to the instructional procedures, several studies have supported this conclusion (Lumsdaine, May, and Hadsell, 1958; Michael and Maccoby, 1961). Another stimulus variable studied in both learning and communications research has been the immediate reinforcement of a subject's

participatory responses. Several studies (e.g., Maccoby, Michael and Levine, 1961; Michael and Maccoby, 1961) have consistently found that immediate reinforcement of these responses had a positive effect upon student performance even when the responses were covert. Therefore, in seeking a powerful treatment to train any particular problem-solving behavior, it was postulated that the factors of requesting overt responses from the subjects and subsequently reinforcing those responses which are correct could be paired effectively with modeling strategies.

Media. The use of video-tape has been encouraged by several leaders in the guidance profession (Wrenn, 1962; Magoon, 1964). Major advantages to this medium are a reproducible sequence of events generated at relatively low cost, and the ease with which competing media such as audio-tape and written booklets can be made comparable in content. However, when compared to audio-tape and written materials, video-tape becomes an elaborate and expensive medium for experimentation in the schools, so strategies relying on audio-tape and written booklets need to be explored as well. While the lecture method has frequently proven less adequate than other methods of teaching (e.g., Lewis, 1964) or only as adequate (e.g., Ulrich and Pray, 1965), it remains a dominant approach in both secondary and higher education. However, the preponderance of research has tested the effectiveness of lecture through information recall based on paper-and-pencil tests rather than through overt performance of some complex behavior. In spite of this fact, it was decided that a traditional live lecture strategy, not just audio and video-tape strategies, and booklet presentations, should be given ample opportunity to demonstrate its usefulness for a comprehensive training program of problem-solving behaviors.

Chapter Summary

The guidance profession has set as one of its major goals assisting individuals to solve personal problems wisely. Several theoretical and research traditions have contributed to the current degree of knowledge held concerning personal problem solving, but each, by itself, is inadequate as either a total explanation of the relevant phenomena or as a model of successful research strategies for the training of effective problem solvers. It seems most productive at this juncture to attempt directly the training of overt behaviors which are postulated to be requisite to the wise solution of real-life problems rather than to engage in attempts at less direct interventions such as the influencing of thought processes or mental skills. The lack of research studies dealing with differentiation on a behavioral basis of effective and ineffective problem solvers, however, necessitates that the behaviors thought to be requisite to effective personal problem solving be inferred from a study of available problem-solving descriptions and paradigms. Previous attempts at training effective problem-solvers as well as related independent research investigations yield a number of insights as to needed improvements in real-life problem-solving research. There must be clear and specific training objectives which indicate what those being trained will be able to do when the training has been completed. An acceptable training effort must also encourage transfer of what is learned to a wide variety of real-life problem situations. Additionally, research must focus on personal characteristics which may influence the effectiveness of various training strategies rather than upon psychological traits which are thought to be associated with some unitary construct of problem-solving

ability. Improved techniques for both accurate and sensitive measurement of both the process and product of problem-solving are needed. In this manner any behaviors which are truly requisite to effective personal problem solving may be validated and the issue of exactly what procedures result in what changes in which subjects can be clarified.

The research outlined in the remainder of this report was an initial investigation aimed at bringing about some of the improvements noted above preliminary to the development of a personal problem-solving training program. It attempted to explore potentially useful training strategies and the influence of an important subject characteristic upon the training of what was postulated to be a key behavioral area in the personal problem-solving process. The specific behaviors investigated as well as the design and procedures employed in the study are discussed in Chapter II.

II. EXPERIMENTAL DESIGN AND PROCEDURES

Skill Area To Be Investigated

The problem-solving skill area that has been chosen for initial study is the generation and consideration of several alternative solutions or courses of action prior to selecting one alternative for implementation. A specification of the behaviors that could be appropriately included in this selected skill area is found on page 22. Previous research relative to this skill area has been primarily concerned with assisting individuals to generate increased numbers of alternatives usually through being trained to produce a number of different responses when they were confronted with the same recurring stimulus. Such a task probably has little personal relevance to each individual. Only the Evans and Cody (1969) study cited earlier included a concern for training an individual to consider several relevant alternatives before making a decision in contrast to merely generating several alternatives. And the experimental task involved something akin to real-life problems.

There is a distinction, therefore, between the concepts of "generating" and "considering" alternatives. In personal problem-solving contexts, it does little if any good to produce possible solutions if (in reality) they are never considered before an alternative is chosen. This investigation will focus upon increasing the quantity and quality of consideration given by subjects to alternative solutions which are provided. The word "considered" is used to indicate that attention is given to each alternative and that the possible outcomes of each are explored. In effect, the individual spends time studying each alternative in some

depth before discarding or accepting it. Even if he can generate alternatives in response to a particular stimulus, he also must be sufficiently open to consider these alternatives, regardless of whether or not they are provided for him by outside sources. The effective problem-solver might well show greater latency in responding though the use of a simple time criterion has been cautioned against earlier.

The main rationale for the selection of this skill lies in its effect upon the whole problem-solving process. A growing body of literature on post-decision dissonance seems to indicate that if one focuses on one possible alternative solution to a problem subsequent to the actual decision, it becomes more difficult to examine information conflicting with the alternative chosen, and similarly more difficult to examine objectively the outcomes of whatever solution is chosen (Brehm and Cohn, 1962). Thus, without the consideration of several relevant alternatives, the problem-solving process is curtailed. In contrast, the individual who sets out to consider several alternatives before selecting one is more likely to be open to incoming information, to utilize that information, to generate further alternatives, and to have a better framework for sorting relevant from irrelevant information concerning these alternatives.

Two further advantages for individuals having proficiency in this skill area exist. First, it seems logical that the consideration of several alternatives increases the probability of selecting a successful (i.e., one producing outcomes most personally satisfying to the individual) alternative. Second, it is likely that a second choice alternative will be available so that it can be adopted as a backup plan to be employed in

case the implementation of the individual's first choice is in some way frustrated.

What kind of experiences would maximize the probability that an individual would consider more than one alternative solution when he was confronted with a personal problem? The purpose of this research was to assess the differential effects of various training strategies upon high school students' reported and actual instances of considering multiple alternatives. The differential effects of three major audio-visual media (video-tape, audio-tape, and booklet) were to be examined as were the effects of combining each of these media with overt participation and social reinforcement of desirable responses. Any interactions existing between these treatment factors and the sex of the subject were also to be assessed.

Experimental Design

Subjects. A device developed especially for the present study, a copy of which appears as Appendix I, was administered to 285 eleventh-graders at a San Francisco Bay Area secondary school located in a low and middle income community. Items were constructed so as to assess the students' need for training in problem-solving behaviors (e.g., I often make a decision without considering several possible solutions to a problem). As part of the same device, the students were asked if they would be interested in learning how to solve problems more effectively. As can be noted from a study of Appendix I, the ten statements which deal with the subjects current problem-solving behavior are to some degree counterbalanced as to direction. A response of "true" to statements #1, #3, #6 and #10, and a "false" response to items #2, #4, #5,

#7, #8 and #9 indicate that the subject is currently performing a desirable personal problem-solving behavior. All respondants who indicated that they did not usually consider many different solutions when solving a problem and who responded positively to either item #11 or #12 were placed in a pool of potential subjects. Secondly, any student whose responses indicated that he did not usually exhibit at least three of the desirable problem-solving behaviors and who responded positively to either item #1 or #2 were added to the subject pool. Lastly, subjects showing either of the above patterns of responses but who did not respond favorably to statements #11 and #12 were added to make a total of 175 students in the pool. Only approximately 25 students, however, were gleaned from this last procedure. From this subject pool, 128 students were randomly selected and assigned, equally divided as to sex, to one of eight treatment conditions. The remaining members of the subject pool were designated as alternates.

Treatments

1. Video-tape model without reinforcement. After receiving the standardized introductory remarks from an experimental assistant, this treatment group viewed a video-tape illustrating a male model whose age corresponded to that of students in the eleventh grade, and who confronted and solved a problem in his own life. The problem of how to spend a summer vacation was chosen since it was thought to be representative of those faced by secondary school students. The video-tape was predominantly concerned with the model's attempts to consider several alternatives before he selected and implemented a solution. Subsequently, the model experienced pleasant consequences as a result of the alternative he chose.

As he worked on solving the problem the model's comments emphasized and made clear the importance of the behaviors under investigation, how to perform the behaviors, and the results of doing so. Other characters in the video-tape provided examples of inappropriate responses to a similar problem situation. A copy of the script of this video-tape, which was produced with the assistance of the San Jose Unified School District in California, appears as Appendix B.

2. Audio-tape model without reinforcement. These subjects were exposed to a tape recording of the sound track from the video-tape. Thus the desired verbal behaviors were modeled for them but without the visual dimension.

3. Written model without reinforcement. A type script of the sound track from the video-tape was presented to this treatment group. The dialogue was preserved and thus the students were still exposed to a demonstration of the desired behaviors though action and sound elements found in the video-tapes were not present.

4. Video-tape model with reinforcement. Once again, the video-tape used in Treatment 1 was presented. However, at selected points the tape was stopped. During each pause, each subject was asked by the experimental assistant if he felt the model should now make a decision. If an individual indicated that he felt the model should not make a decision and should consider additional alternatives, the experimenter reinforced the subject socially through making a positive verbal statement as he recorded the subject's response. Each experimental assistant was provided with a list of verbal statements which were appropriate for use

in this context. These appear as part of the "Instructions to Experimental Assistants" in Appendix A. Each subject received three opportunities for reinforcement and the reinforcement was always administered in the presence of other subjects in that treatment condition. The subjects in each condition involving social reinforcement were always asked questions in the same order. The responses of each subject to these questions were recorded but were not used in data analyses. As reported earlier, the reinforcement treatment procedure added approximately ten minutes to a treatment session.

5. Audio-tape model with reinforcement. The same procedures were followed as are outlined in Treatment 4 with the soundtrack from the video-tape rather than the video-tape itself being utilized.

6. Written model with reinforcement. Derived from the video-tape, the typescript in booklet form was again used. When each subject reached selected typescript points equivalent to the corresponding points in the video-tape, he was instructed in the text to stop reading momentarily. When all subjects had reached the "stop" instructions, the reinforcement procedures outlined in Treatment 4 were employed.

7. Oral lecture. A direct didactic approach to developing the problem-solving behaviors under investigation was used in this treatment condition. Subjects were seated in a classroom and received an introduction describing the purpose of the meeting followed by a 25 to 30 minute prepared lecture using vocabulary appropriate to the eleventh-grade level, and stressing the importance of solving personal problems wisely and elaborating on the importance of considering several alternatives

before choosing a solution. A copy of this script is contained in Appendix C. The danger of considering too many alternatives and thereby not making a decision is mentioned. The effect of this problem-solving skill area on other skill areas in the decision-making process was highlighted and examples of consequences resulting from exhibiting this behavior were used. Several suggestions as to what students should do in order to start manifesting effective behaviors in this area were included. This treatment provided the fourth main medium studied here.

8. Control. A final group of subjects received the same introductory and concluding remarks from an experimental assistant but were not exposed to any materials relevant to the solving of personal problems. Instead, they responded for 30 minutes to written materials (i.e., programmed instructions in statistics) which had no apparent relation to personal problem solving. The assistant was instructed to avoid answering any additional questions or to reply that she did not have the answer to the question.

Criterion Instruments and Measures. From three criterion instruments, a total of nine criterion measures were developed to serve as dependent variables. Seven of that number were derived from two simulated problem-solving situations which were individually administered to subjects. The first of these situations assessed each subject's performance of the desired problem-solving behaviors by using a situation in which each subject was asked to assist a hypothetical problem solver with a personal problem. The second simulation assessed manifestation of the desired behaviors by having each subject select a personal problem of

his own and subsequently select a person to help him resolve that problem.

These two simulation criterion instruments embodied at least two advantages. First, the problem situations to which subjects were exposed were standardized, and second, the problems utilized were indeed of a real-life type. The second simulation had an additional advantage in that the problem situation was somewhat individualized in that the subject selected an individual to assist him with one of his own personal problems. Behaviors exhibited in these simulations were objectively quantifiable and thus amenable to statistical analysis. By utilizing situational assessment procedures, the probability of assessing the quantity and quality of the consideration given to alternative problem solutions was substantially increased. While it may be argued that the amount of time available to subjects in both situations should have been unlimited, real-life problem situations seldom have such temporal freedom. The time limits established should not have been too restrictive, it is true, but preliminary field testing indicated that within a ten minute period most of the information available in each simulation could be secured.

The three criterion instruments and their respective criterion measures are described in the following sections. Since both simulated situations involved equipment usage, each subject was provided with a written instruction sheet and a demonstration of any behaviors necessary for participation (e.g., operating the slide or tape equipment). The assistant was instructed to require each student to exhibit these behaviors before the criterion period began.

1. Hypothetical Problem Situation. Seated in a semi-darkened room, each subject was given verbal instructions with an identical written

instruction sheet and a program describing briefly 32 slides which were available in envelopes on a nearby table. This "Instruction Sheet and Slide Program" appears as Appendix D. Each subject was informed that when the projector was switched on he would be confronted with a description of a problem situation facing a hypothetical student, Jerry, and that he would be allotted ten minutes to decide on a solution to Jerry's problem. In order to assist him in arriving at a decision, he was informed that his "Instruction Sheet and Slide Program" described a number of slides providing information which might be useful in arriving at a solution to Jerry's problem. The slides were placed in categories and each presented a statement describing the interests, abilities, values and background experiences of the hypothetical problem solver; available activities in which Jerry could participate, several alternative courses of action that could be taken; and several consequences that could result from each alternative action. Each category of slides was placed in a separate envelope. A complete set of the slide captions can be found in Appendix E.

Each subject was allowed to select as many slides, and in any order, as he wished. The form used by the observer in collecting data from this criterion measure is found in Appendix F. All slides were placed in envelopes on a nearby table. Subjects were allowed to utilize as much of the ten minutes as they needed. However, they were informed that they must remain in the testing room for the entire ten-minute period allotted for solving the problem. In the event that a subject wished to turn his attention away from the problem-solving task for a portion of the allotted time, alternate activities (i.e., reading materials of interest to students of this age group) were provided in the testing room.

From the first criterion device, the Hypothetical Problem Situation, the number of slides presenting a possible solution to the problem viewed by the subject was accepted as an indication of the number of alternatives to which he gave some consideration. A second criterion measure from this instrument was a measure of the emphasis or degree of attention given by a subject to slides in the "alternative" category. For each subject, a ratio was formed with the number of seconds spent viewing alternative slides as the numerator and the total number of seconds spent viewing alternative slides as the denominator. This ratio was formed since a simple tally of the number of seconds during which "alternative" slides were viewed would make it possible for an individual who had viewed only one "alternative" slide for a large number of seconds to score high on this criterion measure. This ratio was then multiplied by the number of alternative slides viewed in order to weight appropriately the consideration of an optimal number of alternatives. Another, perhaps more sophisticated, problem-solving behavior within the skill area of considering multiple alternatives is studying the possible consequences of each alternative. In order to approximate an assessment of the extra effort that is necessary in real-life in order to learn the possible outcomes of implementing a particular alternative course of action, the slides providing this information for each alternative were packaged separately from the slide actually presenting the specific alternative problem solution. Thus, by receiving the "alternative" slide found inside each information envelope, each subject learned about a specific alternative problem solution to the problem, but he had to open at least one other package within the same information envelope in order to learn about the possible outcomes

associated with the implementation of that alternative. While it could be argued that the nature of this criterion measure would be highly correlated with and thus compound the results from criterion C above, such an argument would have to proceed from empirical data since a high correlation between the two criterion measures is not evident prima facie. Since "alternative" slides and "outcome" slides were wrapped separately, each subject could select neither type, one or the other type, or both types from the envelope. That is, entering the envelope for one type of slide did not necessitate viewing the second type of slide. However, to further examine this issue among others, a complete matrix of correlations between dependent variables is reported subsequently as Table 10. The number of slides viewed from the "outcome" category was tallied and provided this instrument's third criterion measure.

The fourth criterion measure from this instrument was the emphasis or degree of attention each subject gave to the consideration of outcomes. A ratio of the number of seconds spent viewing slides from the outcome category over the total number of seconds during which all slides were viewed was multipled by the number of outcome slides viewed by the subject in order to correct for inefficient or inattentive viewing of only a few "outcome" slides for a large number of seconds. The fifth criterion was the problem solution selected by the subject. Of the six alternative solutions to the problem, three were deliberately structured so as to be more appropriate, based on the information available. Note was taken of whether or not each subject selected one of the more appropriate answers

2. Personal Problem Situation. In this second simulation, each subject was again given oral instructions with an accompanying written instruction sheet and was told to think of a problem he currently was facing in his own life. It was indicated that the problem shouldbe of real importance to him; for example, it might be something he wanted to achieve, such as to overcome an undesirable behavior. He was given an opportunity to write the problem down if he wished. The key task in this simulation was the selection from an array of alternative hypothetical persons, the one the subject felt he would most like to assist him in solving his personal problem.

Information on each of six hypothetical individuals was placed in a series of five packets. Inside one of these five packets was a photograph of the individual while the other packets each contained a tape cartridge providing information on the hypothetical individual's interests, values, abilities, and background (e.g., previous significant experiences and future plans). Complete scripts of the tape cartridges are included as Appendix G. An "Instruction Sheet and Information Packet Program" describing in general terms the information available on each hypothetical individual was given to each student. A copy of this material forms Appendix H. Once again each subject was informed that he must remain in the testing room for the full ten minutes allotted for solving the problem. Alternative activities were available in the testing room if the subject chose to spend time on something other than the criterion task. In this simulation, several tape cartridges containing both popular and classical music were provided as alternate activities. Such materials were provided in both problem-solving simulations to answer at least to some degree the objection that subjects would do well on the dependent variables simply

because no activity outside of the problem-solving task was available to them.

The Personal Problem Situation simulation yielded two criterion measures. The first of these was the number of hypothetical individuals about whom each subject sampled some information. This provided an indication of the number of alternatives receiving some consideration. A second criterion measure from this instrument assessed the emphasis or degree of attention each subject gave to each alternative. A score was obtained for each subject by assigning five points to his first selection of information from each alternative available, four points for a second selection from the same alternative, and so forth. Through this weighting procedure, both the breadth and depth of selections was rewarded. Appendix K provides examples of how sample scores on this criterion measure were obtained.

For this criterion measure, the final choice was not scored or used in data analysis since there were no "correct" responses as there were in the other simulation criterion. The form which appears as Appendix F was used by the assistant to record subject behavior during this problem-solving simulation.

3. Checklist for Solving Problems in Real Life. Additional criterion measures were derived from the pre- and post-treatment administrations of the "Checklist for Solving Problems in Real Life," a copy of which is provided in Appendix I. This instrument, composed of 12 statements describing personal problem-solving behaviors, was designed to assess each subject's need and desire for training in effective problem-solving behaviors. For statements one through ten, each subject

had to decide if the statement accurately reflected his usual problem-solving behaviors. If it did, he placed a checkmark in the column labeled "True"; if it did not, a checkmark was placed in the column marked "False." The statements were counterbalanced as to direction so that, for example, a "True" response sometimes denoted a desirable, and at other times an undesirable personal problem-solving behavior. Statements one through ten on this instrument were designed to reflect whether or not the subject typically exhibited behavior in each of the six skill areas of problem-solving when he attempted to solve his own personal problems.

Statements 11 and 12 gave each subject an opportunity to express in two ways a desire for receiving training in effective personal problem solving. In statement 11, each subject could express an interest in general improvement of his problem-solving behavior; while in response to statement 12, he could make a specific request for training in the behaviors described in statements one through ten. Responses to these statements by the subjects prior to and after exposure to the various treatment experiences were examined and two specific criterion measures were formulated from changes in these responses. The changes in subject responses to this instrument were closely examined and yielded two criterion measures. The first criterion measure involved changes in the self reports of personal problem-solving behaviors provided by each subject between the pre- and post-administration of this check list. For example, if a subject reported before the experiment began that he did not usually consider many different ways to solve a problem (i.e., he checked "False" opposite statement 1), and subsequently at the end of the experiment responded that he did usually consider many different ways to

solve a problem (i.e., he checked "True" opposite that statement), one point was assigned. Similarly, for each response which changed in an unfavorable direction (i.e., either a subject reported that he no longer performed a desirable behavior or reported that he now performed an undesirable problem-solving behavior which he previously did not perform), a point was subtracted from the subject's score on this criterion measure. Appendix L illustrates responses scored in a positive and in a negative manner. Due to the fact that both positive and negative scores resulted from this scoring procedure, all scores were transformed by assigning the lowest score obtained a value of zero, thus eliminating the possibility of negative scores.

A second criterion measure derived from this checklist involved the tabulation of requests for assistance made by students. Positive responses to statements 11 and 12 of the checklist indicated such requests for assistance. Additionally, students were asked to circle the number of each statement specifying a behavior with which they wished some help. All requests were tallied for both administrations of the instrument so that a subject's score corresponded to the change in such requests for assistance. For example, if a subject responded positively to both statements 11 and 12 and circled five statements in the pre-experimental administration of the instrument, he was scored as having made seven requests for assistance. Subsequently, if the same subject responded in a positive manner to only statement 11 and circled two statements on the post-treatment administration of the instrument, he was credited with three requests for assistance after having received the treatment. This subject made four fewer requests for assistance after having received the treatment. Here again, negative scores were possible since an individual might actually

make more requests for assistance after, as compared to before, the treatment. Scores were again transformed in the manner noted above to eliminate negative values. It was expected that effective training would reduce the assistance requests made by each subject.

Hypotheses

The research hypotheses were as follows:

1. Subjects assigned to the video-tape with reinforcement treatment will score higher on the criteria than will subjects assigned to any other treatment condition.
2. Subjects assigned to the three treatment conditions involving social reinforcement will score higher on the criteria than will subjects exposed to similar conditions not involving social reinforcement.
3. Subjects assigned to the two video-tape treatment conditions will score higher on the criteria than will subjects assigned to the two treatments involving written booklets or to the two treatments involving audio-tape, or to a treatment involving an oral lecture, or to the baseline control condition.
4. Subjects assigned to the two audio-tape treatment conditions will score higher on the criteria than will subjects assigned to the two treatments involving written booklets.
5. Subjects assigned to the oral lecture treatment condition will score higher on the criteria than will subjects assigned to the baseline control treatment.

No interactions between media, the use of reinforcement, and the sex of subjects were hypothesized.

Experimental Procedures

Treatment Procedures. Each treatment group was convened in separate rooms within the counseling center at the school and all groups were exposed to treatment experiences within a span of four days. Thus, an attempt was made to minimize the confounding effects of students in different treatment groups spreading information to each other about the study. Though each treatment group had been assigned a specific time to convene and specific subjects had been assigned to each treatment, several changes in the subject composition of each group were necessitated by the realities of the school situation. Factors such as teacher refusal to dismiss a student from class, inefficiency of the system by which messages were hand-carried to classrooms in advance of the scheduled appointment time, and a heavy absentee rate all worked against the administration of treatment procedures as previously planned. However, additional subjects were drawn on a sequential basis from the list of alternates formed earlier from the original subject pool. Additionally, subjects were shifted from one treatment group to another in some instances due to the need to run particular treatment groups at a pre-determined time during the school day. Determinations as to exactly who was shifted to which treatments were an on-the-spot function of the number of subjects assigned to each treatment group who had arrived by a given time and the particular treatments occurring at that hour which had of necessity to be run. Both the limited availability and expense of equipment (e.g., video-tape recorder/player) as well as the limited availability of space in the school counseling center contributed to this need. Since the 128 subjects were chosen originally in a random fashion from the pool of 175 subjects, it was presumed that the remaining

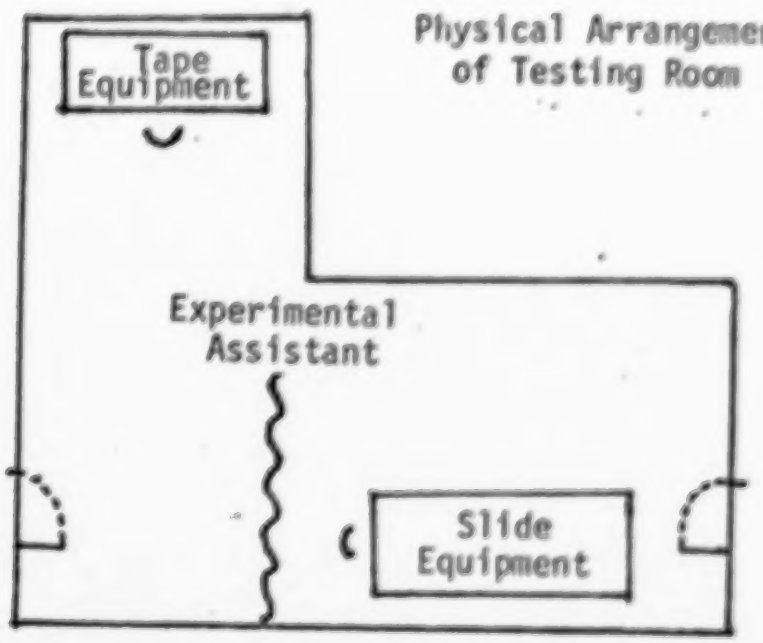
47 subjects formed a random group, and subjects were chosen on a sequential basis from the list of alternates.

The subjects were greeted by an experimental assistant as they arrived at the counseling center and were assigned to the correct room. As soon as the eight assigned students or the required number of replacement subjects had arrived, the treatment was begun. Each treatment not involving the use of social reinforcement was administered in one session of approximately 30 minutes. Those treatments involving social reinforcement procedures took approximately ten minutes longer. It was assumed that the additional ten minutes necessary to the administration of the treatments involving social reinforcement was of no importance as a discrete variable, the social reinforcement procedures alone accounting for any differences resulting on the dependent variables. A standardized set of opening and closing remarks, a copy of which appears in Appendix A, was given by an experimental assistant. After the closing remarks, the subjects were allowed to return to their classes. Subjects were told in the introductory remarks that there was much concern about the importance of students knowing how to solve real-life problems wisely, and that materials had been prepared to help them learn effective personal problem-solving. A copy of this opening statement appears as a portion of Appendix A. Following these remarks the various treatment experiences described earlier were administered. No information regarding the purpose of what was being done, other than the information contained in the opening statement, was given to the subjects.

Data Collection Procedures. Beginning six days following the completion of the treatment procedures, the subjects were summoned

individually in random order to the counseling suite of the high school in which the study took place. Upon his or her arrival, each was greeted by an experimental assistant who explained that since the student had been so helpful in trying out materials the previous week, he had been called in again, this time for the purpose of giving student reactions to some new guidance materials. After reading the instructions provided for the first simulation, each subject entered into the experimental room where both simulation situations were arranged. An L-shaped room was provided for data collection so that different subjects in the two simulations could work simultaneously with minimum interference to each other. In addition, a partial partition was placed between the sections of the room to facilitate this separation. Another advantage to this procedure was that the observer was not conspicuous in the criterion situations since she was both partially screened by the partition and had to divide her attention between two subjects working on different tasks, as shown in Figure 4 below.

FIGURE 4



After being shown the procedure for operating the slide projector used in the first simulation, each subject began the task. A number of

subjects experienced difficulty with this task or with the operating of the tape cassette machine, necessitating on some occasions that both subjects being exposed to the criterion devices stop while further assistance was provided by the experimental assistant or by another of the subjects. At the end of ten minutes, he was asked to choose a solution to the problem, then was led to the section of the room utilized for the second simulation situation, and was provided with the instruction sheet for that simulation. Brief instructions were given regarding the use of the tape cassette player just before each subject began the criterion task. At the end of ten minutes, each subject was requested to indicate the person whom he would most like to have assist him in solving a personal problem. Before each subject left the experimental room, he completed a reaction sheet on which were printed several questions designed to elicit his reactions to the guidance materials he had just used. These reaction sheets were included to give subjects the impression that they were evaluating guidance materials as had been explained to them earlier. A copy of this reaction sheet is found in Appendix J. Accompanying the reaction sheet was a copy of the "Checklist for Solving Problems in Real Life," included as Appendix I, to which he was asked to respond once again. He was thanked for his participation and was told to leave the materials with the assistant outside the room when he was finished. Data collection was spread over a period of two weeks due to the unavailability of students at scheduled times. Criterion data were obtained from a total of 110 of the original 128 subjects. The remaining 18 subjects were lost due to their absence or unavailability during the data collection period at the school.

Statistical Procedures

These then were the nine dependent variables derived from the criterion instruments. Subsequent computer analyses of the collected data were undertaken at the Stanford Computer Facility on an IBM 360/67 computer with computer programs drawn from the BMD Biomedical Computer Programs (Dixon, 1967).

First, BMD program 07D was run on the data from all criteria. This program provided histograms, means and standard deviations for subjects in all treatment groups on each of nine criteria, and facilitated checks on the accuracy of the data. Also available from the program were one-way analyses of variance across all treatment groups on each of the criteria and correlation matrices of the intercorrelations of criterion scores within each treatment group.

Subsequent to this analysis, one criterion measure (i.e., the alternative solution selected by the subject in the Hypothetical Problem Situation simulation) was extracted due to its dichotomous distribution, and dealt with separately through chi-square procedures in an attempt to uncover any significant difference existing between the number of subjects selecting each possible solution to the problem in each of the treatment groups. The first chi-square test compared each of the treatment groups with a combined control group composed of lecture and baseline control conditions and the subsequent two tests compared the effects of treatments utilizing various training media (i.e., video-tape, audio-tape, written booklet) and the effects of treatments in which social reinforcement techniques were and were not employed.

The remaining eight criterion measures underwent three-way analysis of variance procedures implemented through the running of BMD

program 05V. A 2 x 2 x 6 design was employed in a search for main and interaction effects of sex, reinforcement, and treatment group. Treatment groups seven and eight (i.e., lecture and control treatments) were not included in these analyses due to the lack of parallel treatment groups employing reinforcement procedures as noted earlier.

These analyses were followed by t-tests comparing the effects of the lecture and control groups on each of these criterion measures in order to study the feasibility of collapsing these two treatment groups into a single combined control group. Since no significant t's were uncovered, the two groups were subsequently combined and further t-tests were calculated comparing the effect of this combined control group with the effect of each of the remaining six treatment groups on each of the eight criterion measures.

III. RESULTS AND DISCUSSION

Results

Results on a total of nine criteria derived from the three major criterion measures were obtained. Explanations of the derivations of these criteria listed below are found in Chapter II. The reporting of results relative to these criteria will be organized primarily around the sequence of statistical analyses that were employed. Subsequently, each hypothesis will be discussed in light of the results reported and with regard to possible explanations for such results. In some instances, results of criteria will be reported in an order other than that followed in the list of criteria below. For example, it might be more meaningful to discuss simultaneously results on analogous criteria from two different criterion measures rather than to present them in the order assigned.

1. Hypothetical Problem Simulation

   A. Number of viewed slides presenting a possible alternative problem solution.

   B. Time given to slides presenting alternatives in relation to total time viewing all slides.

   C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.

   D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.

   E. Rated appropriateness of the alternative selected as "best."

2. Personal Problem Simulation

   F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.

   G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).

3. Checklist for Solving Problems in Real Life

H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.

I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.

Overall Treatment Effects and Comparison of Active vs. Baseline Control Treatments. In an initial attempt to uncover any gross differences in treatment effects, the BMD program 07D was run on each of the nine criteria. This procedure included the computation of a one-way analysis of variance on each criterion. The resultant means and F ratios appear as Table 1. Desired levels of statistical significance were set at $p<.10$ and $p<.05$ for all analyses. In comparing the active and baseline control groups, no differences at the desired levels of significance were found though in the case of two variables, A and C, significance was approached, ($p<.25$). The two variables on which these trends were found were of considerable interest in this investigation. While findings at the $p<.25$ level of significance are not noted in the data tables and seldom considered in most professional literature, they will from time to time be mentioned in the test. The rationale for reporting such findings lies in their usefulness as clues for future investigations and in the importance of such trends whcn the research deals with complex behaviors which are exhibited in contexts which are not amenable to tight control of all potentially confounding variables (i.e., non-laboratory settings).

To determine whether the lecture treatment fiffered from the baseline

TABLE 1

N's, MEANS, SD's, AND ONE-WAY ANOVA F RATIOS FOR RAW SCORES ON EACH OF NINE DEPENDENT VARIABLES

Dependent Variable		TREATMENT CONDITION: Video-Tape without Reinforcement	Audio-Tape without Reinforcement	Written Booklet without Reinforcement	Video-Tape with Reinforcement	Audio-Tape with Reinforcement	Written Booklet with Reinforcement	Lecture	Baseline Control	One-Way ANOVA F Ratio
A. Number of viewed slides presenting a possible alternative problem solution.	$\bar{X}$	3.467	3.571	2.333	3.933	3.308	4.167	3.692	4.067	1.505
	σ	1.552	2.027	2.015	1.223	1.702	1.528	1.548	1.710	
	N	15	14	12	15	13	12	13	15	
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	$\bar{X}$	47.267	74.357	26.583	46.933	45.923	58.583	62.769	82.200	1.153
	σ	33.553	114.604	33.776	29.581	53.641	51.235	44.389	72.691	
	N	15	14	12	15	13	12	13	15	
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	$\bar{X}$	5.800	4.357	3.083	5.933	4.385	5.167	4.692	5.133	1.469
	σ	3.427	3.201	2.875	2.463	2.815	2.657	2.287	1.922	
	N	15	14	12	15	13	12	13	15	
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	$\bar{X}$	192.000	130.857	97.500	183.067	146.846	186.500	125.154	153.067	.860
	σ	144.086	143.924	103.379	119.421	186.230	161.700	71.538	86.711	
	N	15	14	12	15	13	12	13	15	
E. Rated appropriateness of the alternative selected as "best."	$\bar{X}$	1.467	1.500	1.583	1.733	1.308	1.500	1.692	1.733	1.280
	σ	.516	.519	.515	.458	.480	.522	.480	.458	
	N	15	14	12	15	13	12	13	15	
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	$\bar{X}$	4.333	4.000	4.250	4.643	4.615	4.500	5.214	4.933	1.019
	σ	1.589	1.754	1.603	1.216	1.557	1.382	1.051	1.163	
	N	15	14	12	14	13	12	14	15	
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives.	$\bar{X}$	41.600	38.143	42.250	42.500	40.385	46.083	47.571	43.667	1.034
	σ	12.704	12.328	12.491	9.960	12.373	12.221	5.893	7.979	
	N	15	14	12	14	13	12	14	15	
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	$\bar{X}$	2.070	1.765	2.644	2.335	1.557	1.371	2.293	3.089	.595
	σ	8.000	7.250	7.083	8.286	7.385	7.333	8.214	7.400	
	N	15	12	12	14	13	12	14	15	
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	$\bar{X}$	7.200	6.750	7.250	7.071	6.692	6.167	7.786	6.400	.559
	σ	1.897	1.658	4.245	1.492	1.932	1.801	3.093	2.971	
	N	15	12	12	14	13	12	14	15	

*Statistically significant at the $p<.10$ level.
**Statistically significant at the $p<.05$ level.
***Statistically significant at the $p<.01$ level.

was not, in terms of its effects, an entity different from the baseline control treatment in which programmed statistical materials were used. In order to confirm or contradict this conclusion, t-test procedures were undertaken to compare the effect of the live lecture treatment with that of the baseline control treatment on each of eight criteria. Prior to this analysis, criterion E, owing to its dichotomous distribution was separated from the other criteria and analyzed through the use of distribution-free (i.e., non-parametric) techniques.

Table 2 presents the t-values resulting from the t-test procedures. Though in a number of cases the live-lecture group appeared to be somewhat superior to the baseline control group, none of the t-values attained desired levels of significance. Therefore, data from these two treatment groups were subsequently "pooled" for further analysis. Hereafter, except when specifically noted, this pooled control group will be referred to rather than the active and baseline control conditions as previously specified.

Pooled Control Treatment vs. Selected Experimental Treatments. Further t-tests were then employed in an effort to uncover any existing differences between the effect of the pooled control group and the effect of each of the remaining six treatment conditions on each of the eight dependent variables involving parametric data. The results of the 48 t-tests appear as Table 3. One of the dependent variables of prime concern was variable A and with regard to this variable it is striking to note that the scores of the pooled control group actually were higher than the scores of four of the six groups with which it was compared (i.e., all three conditions not utilizing reinforcement and the audio-tape condition which did include reinforcement procedures). As can be noted from Table 3,

Table 2

RESULTS OF t-TEST PROCEDURES COMPARING EFFECTS
OF ACTIVE AND BASELINE CONTROL CONDITIONS UPON EACH OF EIGHT DEPENDENT VARIABLES

Dependent Variable	t-Ratio
A. Number of viewed slides presenting a possible alternative problem solution.	0.583
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	0.808
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	0.534
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	0.887
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	0.657
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	0.733
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	0.773
I. Net decrease (i.e., pre- and post-treatment) in number of written requests for assistance with personal problem-solving bahaviors.	1.188

*Statistically significant at the $\rho<.10$ level.
**Statistically significant at the $\rho<.05$ level.
***Statistically significant at the $\rho<.01$ level.

Table 3

RESULTS OF t-TEST PROCEDURES COMPARING EFFECTS OF POOLED CONTROL CONDITION AND EACH OF THE SIX REMAINING TREATMENT CONDITIONS

Dependent Variable	Pooled Control Condition Versus					
	Video-Tape without Reinforcement	Audio-Tape without Reinforcement	Written Booklet without Reinforcement	Video-Tape with Reinforcement	Audio-Tape with Reinforcement	Written Booklet with Reinforcement
A. Number of viewed slides presenting a possible alternative problem solution.	.814	.543	*** 2.523	- .084	1.033	- .489
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	* 1.492	- .042	*** 2.427	* 1.535	* 1.349	.709
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	-1.014	.679	** 2.280	* -1.380	.677	- .298
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	* -1.484	.261	* 1.375	* -1.373	- .158	-1.182
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	** 1.757	** 2.380	** 1.837	1.123	1.055	* 1.360
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	1.285	** 2.419	1.034	1.116	* 1.656	- .168
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	- .253	.623	.748	- .569	.493	.544
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	- .148	.333	- .149	- .002	.400	.932

*Statistically significant at the $\rho<.10$ level.
**Statistically significant at the $\rho<.05$ level.
***Statistically significant at the $\rho<.01$ level.

NOTE: Comparisons were always made with the score of the pooled control group as the basic referent. Therefore, a negative t-value denotes that the mean score of the treatment in question proved to be higher than that of the pooled control group. Similarly, a positive t-value is evidence of the reverse phenomenon.

one of these differences, a comparison with the non-reinforcement booklet condition, reached a desired level of significance ($p < .01$). Only the scores of subjects in the video-tape and booklet treatments employing reinforcement procedures proved to be higher than those in the pooled control group, though not at the desired statistically significant level. A similar finding discussed below resulted on variable F in the second simulated situation.

Variable C provided information on just how many of the 12 slides presenting information on possible outcomes were viewed by the subjects. On this variable, the video-tape approach utilizing reinforcement techniques was clearly superior ($p < .10$) when compared with the pooled control effect. Two other groups, the video-tape without reinforcement condition and the written booklet combined with reinforcement, also proved more effective than the control condition, though the differences did not achieve desired levels of statistical significance. Other comparisons on this variable found the effect of both audio-tape treatments almost identical but not significantly below that of the control, and the effect of the written booklet without reinforcement significantly below ($p < .05$) that of the control.

The scores from the pooled control group on variable B proved to be significantly higher than those of subjects in the booklet without reinforcement group ($p < .01$) and higher than the scores of subjects exposed to either of the video-tape treatments or those of subjects in the audio-tape with reinforcement group ($p < .10$). The audio-tape without reinforcement and the written booklet with reinforcement treatments appeared not to differ from the pooled control in their effect. From data on this criterion, it is clear that the subjects in the pooled control group spent a greater number of seconds per slide relative to their total viewing time

on the slides they selected from the "alternative" category than did most other subjects. Information from variable D, however, presented a somewhat different picture. The relative time emphasis given to the slides from the "outcome" category showed the effect of the video-tape condition not containing reinforcement superior at a desirable level of significance ($p < .05$) to that of the pooled control, while the superiority of the parallel treatment involving reinforcement reached the $p < .10$ level. Though scores of subjects in the written booklet with reinforcement group approached significance ($p < .25$) when compared to scores of subjects in the pooled control group, scores of subjects in the two audio-tape treatments did not differ from those of control subjects and scores of subjects who experienced the written booklet without reinforcement group appeared significantly below those of subjects in the pooled control condition ($p < .10$).

t-test results relative to variable F revealed the scores of subjects in the pooled control group to be far higher ($p < .05$) than the scores of subjects in each of the three treatments not employing social reinforcement procedures and significantly higher ($p < .10$) than those of subjects exposed to the written booklet treatment which included reinforcement. Only the scores of subjects in the video-tape and audio-tape treatments with reinforcement failed to be appreciably lower than scores of subjects in the pooled control treatment. Results on variable G proved to be slightly more balanced in that the scores of subjects in the pooled control group surpassed those of only two of the six competing treatment groups. While scores from subjects in both audio-tape treatments were found to be significantly lower than those of the control subjects (without reinforcement $p < .05$, with reinforcement $p < .10$), control subjects' scores failed to differ noticeably from those attained by subjects in either the video-tape treatments or the

written booklet treatment in which no reinforcement procedures were used. The scores of subjects in the written booklet treatment using reinforcement were found to be slightly but not significantly higher than those of subjects in the pooled control group.

No t-values at desired significance levels were uncovered in data derived from two additional criteria. Variable I assessed the number of written requests for assistance in problem-solving training made by subjects after, as opposed to before, they were exposed to one of the experimental treatments. Invariably, fewer requests were made after the treatment, but no treatment was found to result in significantly more changes in this regard than any other treatment. Similarly, no significant differences at the desired levels were found on variable H which measured the ability of the various treatments to inspire changes in subjects' self-reports of their typical problem-solving behaviors.

As noted earlier, variable E, the particular alternative solution chosen by the subject as most appropriate in the Hypothetical Problem Simulation was analyzed separately through non-parametric procedures. The chi-square technique was chosen for this purpose. The $p < .10$ level of significance was chosen as the critical value for rejection of the null hypothesis that no differences existed between the number of persons in each treatment group achieving a "correct" response on this measure. Table 4 reveals that the difference between the live lecture and the baseline control group in this regard did not reach the desired level of significance. Thus once again, these two groups were combined to form a pooled control group. Subsequently, an overall chi-square analysis between treatment groups was undertaken. As can be seen in Table 5, the overall chi-square value fell short of achieving significance, but was sufficiently

Table 4

RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBERS OF SUBJECTS IN THE LECTURE AND BASELINE CONTROL GROUPS SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Lecture	9	9.3	4	3.7	13
Baseline Control	11	10.7	4	4.3	15
Totals	20	20.0	8	8.0	28

Obtained Value $\chi^2 = .06$

Critical Value at $p<.10$ level w/1 df = 2.71

Table 5

RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBERS OF SUBJECTS IN EACH TREATMENT SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Video-Tape without Reinforcement	7	8.5	8	6.5	15
Audio-Tape without Reinforcement	7	8.0	7	6.0	14
Written Booklet without Reinforcement	7	6.8	5	5.2	12
Video-Tape with Reinforcement	11	8.5	4	6.5	15
Audio-Tape with Reinforcement	4	7.4	9	5.6	13
Written Booklet with Reinforcement	6	6.8	6	5.2	12
Pooled Control	20	15.9	8	12.1	28
Totals	62	61.9	47	47.1	109

Obtained Value $\chi^2 = 8.89$

Critical Value at $p<.10$ level w/6 df = 10.64

Table 6

RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBER OF SUBJECTS (GROUPED ACROSS REINFORCEMENT CONDITIONS) SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Video-Tape	18	17.1	12	12.9	30
Audio-Tape	11	15.4	16	11.6	27
Written Booklet	13	13.7	11	10.4	24
Pooled Control	20	15.9	8	12.1	28
Totals	62	62.1	47	47.0	109

Obtained Value of $\chi^2 = 5.58$

Critical Value at $\rho<.10$ level w/3 df = 6.25

Table 7

RESULTS OF CHI SQUARE PROCEDURES COMPARING THE NUMBER OF SUBJECTS (GROUPED ACROSS MEDIA) SELECTING AN APPROPRIATE SOLUTION TO THE HYPOTHETICAL PROBLEM SIMULATION

Treatment Group	Acceptable Response		Unacceptable Response		Marginal Totals
	Observed	Expected	Observed	Expected	
Without Reinforcement	21	23.3	20	17.7	41
With Reinforcement	21	22.7	19	17.3	40
Pooled Control	20	15.9	8	12.1	28
Totals	62	61.9	47	47.1	109

Obtained Value of $\chi^2 = 3.67$

Critical Value for $\rho<.10$ level w/2 df = 4.60

close to the critical value to warrant further chi-square analyses which were then conducted. The first analysis, the data from which are shown in Table 6, grouped subjects according to media regardless of the reinforcement conditions used and then compared the number of each treatment group's subjects choosing one of the appropriate alternative solutions. Table 7 provides data from a second analysis which made a similar comparison between the responses of subjects in treatments employing social reinforcement and those of subjects in treatments where such techniques were not present. In both cases, the chi-square values approached, but did not reach desired levels of significance. Such results would indicate a high likelihood that there were no differences in the number of subjects selecting an appropriate response on criterion E, regardless of whether these subjects were grouped by specific treatment conditions, by the training medium to which they were exposed, or by their exposure to social reinforcement procedures.

Influence of Sex, Media, and Reinforcement Upon Selected Treatment Groups. In order to pinpoint more precisely the effects of the various treatment media, of the social reinforcement procedures, and of subjects' sex, a three-way analysis of variance (media x reinforcement x sex) was executed through use of BMD program 05V on parametric data from each of eight criterion measures. Since the live lecture and baseline control treatments did not have parallel groups employing social reinforcement procedures, these two treatments were not included in this analysis. Among the remaining six treatments, subjects exposed to video-tapes, audio-tapes, and written booklet treatments were compared, subjects experiencing social reinforcement procedures were compared with subjects not experiencing reinforcement and subjects were compared on the basis of sex. Table 8 portrays means, standard deviations and all cell sizes used in each of these analyses.

Table 8

N's, MEANS, AND SD's FOR THREE-WAY ANOVA ON EACH OF EIGHT DEPENDENT VARIABLES

Dependent Variable		Male						Female					
		Without Reinforcement			With Reinforcement			Without Reinforcement			With Reinforcement		
		Video-Tape	Audio-Tape	Written Booklet	Video-Tape	Audio-Tape	Written Booklet	Video-Tape	Audio-Tape	Written Booklet	Video-Tape	Audio-Tape	Written Booklet
A. Number of viewed slides presenting a possible alternative problem solution.	$\bar{X}$	3.000	3.285	2.428	3.714	3.125	3.714	3.875	3.857	2.200	4.125	3.600	4.800
	σ	1.825	2.138	1.902	1.380	1.959	1.253	1.246	2.035	2.387	1.125	1.341	1.788
	N	7	7	7	7	8	7	8	7	5	8	5	5
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	$\bar{X}$	42.428	80.428	29.571	39.142	47.500	58.000	51.500	68.285	22.399	53.750	43.399	59.399
	σ	36.059	150.539	32.160	31.876	64.258	49.264	33.060	75.557	39.348	27.665	37.326	59.806
	N	7	7	7	7	8	7	8	7	5	8	5	5
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	$\bar{X}$	4.857	3.714	3.142	5.714	3.750	5.285	6.625	5.000	3.000	6.125	5.400	5.000
	σ	3.933	3.592	2.794	2.811	3.105	2.360	2.924	2.886	3.316	2.295	2.190	3.316
	N	7	7	7	7	8	7	8	7	5	8	5	5
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	$\bar{X}$	149.571	99.285	102.571	177.142	101.125	217.428	229.125	162.428	90.399	188.250	220.000	143.200
	σ	143.430	98.962	103.070	124.606	96.781	184.025	143.223	181.000	115.526	123.078	277.096	130.723
	N	7	7	7	7	8	7	8	7	5	8	5	5
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	$\bar{X}$	5.000	3.857	4.714	4.166	5.000	4.428	3.750	4.142	3.600	5.000	4.000	4.600
	σ	1.527	1.864	1.380	1.329	1.309	1.397	1.488	1.772	1.816	1.069	1.870	1.516
	N	7	7	7	6	8	7	8	7	5	8	5	5
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	$\bar{X}$	45.857	35.285	44.428	40.166	43.750	43.285	37.875	41.000	39.200	44.250	35.000	50.000
	σ	15.137	12.919	8.772	13.166	12.521	12.566	9.613	11.972	17.137	7.225	11.224	11.874
	N	7	7	7	6	8	7	8	7	5	8	5	5
H. Net increase (i.e., pre- and post treatment) in subject's self-reports of desirable personal problem-solving behaviors.	$\bar{X}$	9.428	7.200	6.285	8.333	7.750	7.285	6.750	7.285	8.200	8.250	6.800	7.400
	σ	1.902	2.167	1.603	3.204	1.035	1.253	1.281	1.603	3.563	1.669	2.167	1.673
	N	7	5	7	6	8	7	8	7	5	8	5	5
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	$\bar{X}$	7.857	5.800	7.000	7.000	7.000	6.000	6.625	7.428	7.600	7.125	6.200	6.400
	σ	1.772	.045	5.196	1.788	2.138	2.000	1.922	1.902	2.966	1.356	1.643	1.673
	N	7	5	7	6	8	7	8	7	5	8	5	5

Table 9

F RATIOS OBTAINED AS THE RESULT OF THREE-WAY ANOVA (SEX x REINFORCEMENT x MEDIA)

Dependent Variable	Main Effects			Interactions			
	Sex	Reinforcement	Media	Sex x Reinforcement	Sex x Media	Reinforcement x Media	Second Order Interactions
A. Number of viewed slides presenting a possible alternative problem solution.	1.875	** 3.621	.346	.105	.026	* 2.494	.469
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	.000	.006	.538	.068	.191	1.481	.001
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	1.335	1.481	* 2.528	.078	.531	.806	.154
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	.881	1.160	.845	.142	1.326	.625	.377
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	1.000	1.056	.059	1.009	.049	.063	2.238
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	.111	.610	1.303	.339	.089	.242	* 2.629
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	.351	.063	1.958	.008	* 2.427	.012	* 2.404
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	.048	.621	.378	.150	.406	.364	1.040

*Statistically significant at the $p<.10$ level

**Statistically significant at the $p<.05$ level

***Statistically significant at the $p<.01$ level

Table 9 presents all the resulting F ratios. Results, in terms of both main effects and interactions, will be reported by criteria.

An analysis of variable A produced two D ratios reaching the desired significance levels of $p<.10$. The first of these was a reinforcement by media interaction which was attributable primarily to the strength added to the written booklet approach by the addition of social reinforcement procedures (cf. Table 8). In fact this treatment moved from the least effective to the most effective treatment with the females, and tied with video-tape utilizing reinforcement as the most effective treatment with males. The effect of introducing reinforcement with the video-tape strategy was more moderate. The effect of reinforcement was, however, sufficient in the case of both video-tape and written booklet that it more than offset a reversal of this result among treatment conditions employing the audio-tape. Examination of main effect results on this variable revealed that the addition of reinforcement procedures had a significant ($p < .05$) effect which resulted almost entirely from the power social reinforcement added to the written booklet and video-tape materials. Though a trend ($p < .25$) toward higher scores by females than males was found on this measure, the main effect of sex did not reach the required level of significance.

Several variable C findings appearing in Table 8 are of import. The overall media main effect was significant ($p < .10$) with video-tape, audio-tape, and written booklet strategies being effective in that order. Data from variable C were consistent with data from variable A in the sense that adding social reinforcement to the written booklet strategy consistently increased its effectiveness appreciably. In the case of the males responding on variable C, the booklet strategy moved from third to second in effectiveness when social reinforcement was added while the addition of reinforcement to the video-tape resulted in much less increase in power and in

the case of the audio-tape condition, reinforcement had virtually no increased effect at all. In regard to females, the relative order of effect remained video-tape, audio-tape, and written booklet, though the difference in means between the media appeared to be smaller and again social reinforcement made little difference in the response of audio-tape subjects and of the video-tape treatment group.

On variables B and D which dealt with the time in seconds which subjects spent viewing "alternative" and "outcome" slides, no significant F's resulted. Once again, however, the considerable increase of power attained when social reinforcement was added to the written booklet condition was apparent. In the case of both males and females, on variable B, this treatment moved from the least to the most effective with the introduction of social reinforcement. The only barrier which kept this shift from attaining statistical significance as an interaction effect seemed to be the movement in the reverse direction by the audio-tape treatments. Apparently, these trends statistically cancelled each other out. Results from variable D portrayed in Table 8 were similar with the exception that the written booklet did not increase its relative position in power among females in spite of the increased effect given it by social reinforcement. It did, however, again move from the least to the most effective with males.

Variable F, from the Personal Problem-Solving Situation, and variable H in the Hypothetical Problem Situation are analagous criteria in that they are both measures of the number of alternatives to which some consideration is given by the subject. No F ratios of desired significance are reported in Table 9 relative to variable F. However, a close study of the data in Table 8 shows the same pattern of reinforcement effects in regard to female subjects on variable F as occurred in the case of both males and females in regard to variable A, and to a large degree in the case of variables B and D as well. Specifically, this pattern involved a substantial increase in the effect of the written booklet treatment with the introduction of

reinforcement much less or no increase in the case of the video-tape medium and a decrease in the effect of the audio-tape strategy when reinforcement was introduced. Though this pattern did not hold in the case of male subjects on variable F, the reversal was minimal.

A significant sex x media interaction ($p < .10$) was one of two F ratios reaching the desired level of significance in the data from variable H appearing in Table 9. Contributing to the sex x media interaction were the apparent greater effectiveness of a video-tape strategy for males in contrast to females and a similar advantage for the written booklet strategy for females when compared to males. The effects resulting from the written booklet approach appeared to contribute little to this interaction. A main effect of media (video > audio or written booklet) approached but did not achieve the desired level of statistical significance ($p < .25$). A significant ($p < .10$) second order interaction effect on variable H revealed a pattern of opposite effects for males and females when reinforcement was added to each of the three treatment media. That is, on this variable whenever the effect of reinforcement upon a particular medium was positive for males, it was negative for females and vice versa. The effect of reinforcement was positive for females with regard to video-tape and positive for males in the case of audio-tape and written booklet strategies.

Variable G was devised to tap the degree of consideration given to alternatives by subjects in the Personal Problem-Solving Situation. Data from this criterion appearing in Table 9 revealed that the second order interaction was significant at the $p < .10$ level. Opposite effects in the case of each sex from adding reinforcement to each medium characterized this interaction. In the case of male subjects, the video-tape treatment

strategy appeared to carry more effect when not combined with social reinforcement while the reverse was true with females exposed to the same medium. The effect of reinforcement upon the audio-tape strategy was also reversed dependent upon sex, the effect being positive with males and negative with females. The interactions with regard to both variable G and variable H were thus found to be in the same direction. Finally, the written booklet decreased in effect among males with the addition of reinforcement and increased substantially among females with the same addition.

No F ratios of significance appeared in the data from variable I. All the treatment strategies seemed quite similar in their ability to bring about a decrease in the number of written requests for assistance in problem-solving training. Data trends on this variable differed from those on other variables in that the social reinforcement procedure with a written booklet did not appreciably increase the effect of such a strategy with either males or females. The same can be said for the audio-tape strategy with regard to females but not with respect to males where the opposite seemed to hold true. That is, while the effect of the audio-tape treatment among females showed the customary decrease with the introduction of social reinforcement, it increased, though not significantly, among male subjects when social reinforcement was included. With respect to the video-tape strategy, reinforcement brought lower scores among male subjects and slightly increased scores on this variable among females.

Summary of Results. Data resulting from nine dependent variables have been reported. No one treatment medium with or without reinforcement procedures was found to be superior with either males or females on all of these criteria. Rather the most effective treatment seemed to vary depending on the particular behavior being investigated and the sex of the subjects. When the scores of the live lecture and baseline control subjects were

compared, they were found to be not significantly different on any of the criteria. Subsequent to these analyses, these two treatment groups were combined to form a pooled control group. The mean score of male and female subjects in this pooled control group was compared with the mean score of male and female subjects in each of the competing treatments through t-test procedures analyzing parametric data on eight criteria. In the case of one criterion, variable E, chi-square non-parametric procedures were employed to make similar comparisons. Relative to the competing treatments, the scores of subjects in the pooled control group on the dependent variables varied substantially from criterion to criterion. Of the 48 t-ratios obtained, 16 reached desired levels of significance. Three of these were in the hypothesized direction while the remaining 13 were in the opposite direction. The three hypothesized differences at desired levels included the video-tape with reinforcement strategy on variables C ($p<.10$) and D ($p<.10$) and the video-tape without reinforcement strategy on variable D ($p<.10$) proving to be significantly superior to the pooled control condition. The pooled control condition appeared more effective than the video-tape without reinforcement condition on variables B ($p<.10$), and F ($p<.05$) and more effective than the same medium with reinforcement on variable B ($p<.10$). Similarly the pooled control condition proved more powerful than the audio-tape without reinforcement approach on variables F and G ($p<.05$) and than the same approach with reinforcement on variables B and G ($p<.10$). With regard to comparisons with the written booklet approach without reinforcement, the pooled control scores were higher at the $p<.10$ level on variable D, at the $p<.05$ level on variables F and C, and at the $p<.01$ level on variables A and B. However, only on variable F ($p<.10$) were pooled control scores significantly higher than the written booklet utilizing reinforcement.

The findings reported here should be interpreted with extreme care. Operating with the desired level of significance set at $p<.05$ and making the assumption that all the means reported were random samples from the same population mean, one would expect close to five t-tests to be significant merely as the result of chance. In the analyses reported above, while 16 t-tests were significant, only three were in the hypothesized direction. Thus, while it may be the case that the particular t-tests found to be significant may be the results of experimental efforts, they may also be the result of chance factors, replication being the major recourse for validating these results.

In order to more precisely gauge the effect of the sex, media, and reinforcement independent variables, a three-way analysis of variance (sex x media x reinforcement) was carried out on each of eight dependent variables. No main effects of sex were found to be significant at less than the 10 percent level, though on variable A, desired levels of significance were approached ($p<.25$). In terms of reinforcement main effects, data on variable H were found to be significant ($p<.05$) in that strategies containing social reinforcement proved to be of greater effect than strategies not employing the procedure. The only main effect of media found to be significant ($p<.10$) was on data for variable C, though a trend ($p<.25$) was observed with regard to data on variable H. In both cases, video-tape produced the greatest desirable increases in subjects' responses while audio-tape and written booklet strategies were less effective and about equal to one another. Of 32 interactions computed, four were found to be significant at desired levels. Thus, as noted above with regard to the t-test anaylses, extreme caution must be used in interpreting these findings. Of the eight interactions involving sex x media and reinforcement c media one interaction of each type yielded an F ratio of a desired significance level ($p<.10$). The former occurred on data for variable H, with the major contributors being the greater

effectiveness of video-tape strategies with males than with females and the higher effect of audio-tape treatments with females than with males. Results associated with the written booklet strategy on this variable did not contribute to the interaction. The significant reinforcement x media interaction found in data from variable A was apparently the result primarily of the ineffectiveness brought about in the written booklet treatment from the addition of reinforcement. The addition of reinforcement in the case of video-tape and audio-tape treatments results in substantially less shift in effect. Finally, one second order interaction at less than the 10 percent level was analyzed in data from variable G and one from data on variable H. Both of these involved essentially reversed effects on the basis of sex of adding social reinforcement to each of the treatment media. Whenever the effect of reinforcement was positive for one sex, it was negative for the other sex and vice versa. With regard to the second order interaction found on variable G, video-tape and audio-tape strategies contributed in a roughly equal degree to this interaction. In contrast, the written booklet results indicated a large shift in effect among females as a result of reinforcement with a negligible negative shift among males. Relative to the second order interaction associated with criterion H, the reversed shifts among the sexes due to the effects of reinforcement were of roughly analogous magnitude in the case of each training medium. All the results reported here are discussed in the next section of this report. Initially, the discussion of results will center around the hypotheses stated in Chapter II and subsequently, it will explore reasons for, and factors contributing to the results obtained.

Discussion

Prior to a more general discussion of the results just reported, those which relate specifically to the hypotheses stated on page 65 will be discussed.

Video-tape with Reinforcement vs. Competing Treatments. Little evidence was gleaned from the data which would support the hypothesis that a video-tape strategy employing social reinforcement procedures would result in higher scores on all criteria than would any competing treatment. On variables C and D, the video-tape with reinforcement treatment did tend to have a significantly greater effect ($p < .10$) than did the pooled control treatment (cf. Table 3), but on only variable C was its effect superior to that of all other competing treatments. On variable D, video-tape with reinforcement as a strategy was second to the video-tape without reinforcement treatment in terms of greatest effect. In reality, no one treatment was shown to be superior irrespective of the criterion problem-solving behavior in question or of factors such as subject sex and the presence of social reinforcement. A study of Tables 3 and 8 shows that several different treatments were highly effective depending on the particular problem-solving behavior, the sex of the subject, and whether or not reinforcement procedures were included.

Effects of Reinforcement. Hypothesis two which postulated that treatments employing social reinforcement would always have greater effect than those without it was supported only by some data from variable A. Table 8 indicates that on this variable, the addition of reinforcement brought significantly ($p < .05$) more positive results. A trend ($p < .25$) toward such a result was also found on variable C. On most variables, the introduction of reinforcement procedures increased the effect of the video-tape and the written booklet treatments, but was often detrimental to the

effect of the audio-tape condition. Data from variable A revealed a sex x reinforcement interaction ($p < .10$) indicating that the positive effect of social reinforcement was largely felt among female subjects (cf. Table 8). Variables A and C were criteria of prime interest in the investigation, however, thus such data should be given considerable weight. Thus, treatments utilizing reinforcement proved superior, not, as was hypothesized, on all criteria but rather on those criteria quite closely related to the behavior for which the reinforcement was provided.

The Effect of Variations in Media. It was hypothesized that the order of media effectiveness would consistently be video-tape, audio-tape, and written booklet in order of decreasing effectiveness. Data from variable C provided some support for hypothesis three. The media effect ($p < .10$) found here was the result of video-tape treatments having a greater effect than audio-tape strategies, which in turn had a greater effect than written booklet approaches. A trend ($p < .25$) similar in nature was found in data from variable H. In the latter case, the finding was largely due to the high scores of male subjects in all treatment groups, whereas in the former case the result was attributable to the scores of both male and female subjects except in the case of the written booklet with reinforcement condition, where male subjects scored higher than did female subjects. Thus, on only two of nine dependent variables did video-tape, audio-tape and written booklet strategies tend toward the hypothesized order of effect. Therefore, the directional prediction of Hypothesis three was not supported.

Written Booklet vs. Audio-Tape. Written booklet and audio-tape strategies produced effects not significantly different from one another on each criterion. The effect of written booklet and audio-tape approaches appeared upon inspection to approach differences reaching the desired levels of statistical significance on a number of criteria. However, when standard

deviation statistics were taken into consideration such differences proved to be not significantly different. Examples of such instances can be found in Table 8 on variable C among males and on variable F among females exposed to strategies containing social reinforcement. Only on two variables, A and C, did the data indicate that the effects of the written booklet and audio-tape had different effects at, or less than, the 10 percent level. This was indicated by the main effect of media which reached the desired level of significance on variable C ($p<.10$) and in the reinforcement x media effect which reached a desired level of significance ($p<.10$) on variable A. Notwithstanding these two findings, the preponderance of evidence indicated that in the case of seven of the nine dependent variables, the two approaches, audio-tape and written booklet, produced effects not significantly different from one another.

Lecture vs. Baseline Control. The hypothesis asserting that the lecture treatment would possess greater effect than the baseline control treatment which involved exposing subjects to programmed statistics materials received no support. t-test procedures on each of eight variables resulted in no significant differences at the desired levels between the two groups (cf. Table 3). Chi-square data from variable E also indicated this lack of differences. The groups were subsequently combined into a pooled control group.

Summary of Support for Hypotheses. Of the five major hypotheses set forth prior to the investigation, none received substantial support. In contrast to the lack of support uncovered for the najor hypotheses, a number of findings, primarily interactional in nature provided valuable information which will be discussed in the remainder of this chapter. In addition, these results have implications for the development of a training program for personal problem-solving behaviors, a topic which will be considered in Chapter IV.

Effects of Lecture and Baseline Control Groups. The lack of difference found between the results of subjects in the lecture and baseline control groups was not expected. An attempt has been made to provide a lecture having a wide variety of interesting oral examples and to utilize a dynamic forceful individual as lecturer. In contrast, the baseline control subjects dealt with written materials on descriptive statistics and it was expected that the mode and the content of these materials would lend themselves to measuring baseline pre-post changes in the subjects in terms of the criteria employed. A comparison finding equally unexpected was the fact that both the lecture approach and the programmed statistics strategy fared rather well in comparison with the competing treatments on most criteria. While several plausible explanations can be offered for the fact that the live lecture approach elicited results to those of the competing treatments, few can be offered for the quantity of problem-solving behavior manifested by subjects exposed to the programmed statistics materials.

It might be postulated that some features of the programmed materials were found stimulating, such as the programming format itself or the content of the materials which involved solving sample statistical problems drawn from the practical situations and answering questions related to these examples. It might also be possible that such a treatment heightened the subjects' sensitivity to a need for assistance in personal problem solving and that they subsequently were particularly prepared to "learn" during the criterion phase of the investigation. During the treatment session, several subjects in the group exposed to programmed statistics materials expressed their dissatisfaction with the materials to which they were exposed, saying that they did not feel the statistics exercises provided any help in personal problem solving. As a result, this treatment experience may have heightened the desire of such subjects for assistance, or in some other way increased

their receptivity to the criterion experiences which were most certainly relevant to personal problem solving. However since this condition functioned as a baseline control the criterion behaviors occurring among these subjects must be considered as the quantity normally occurring and no statement can be made regarding supposed effects of this treatment.

t-test Comparisons. Results of t-test procedures on variables B and D presented an important paradox. Data from variable B showed that subjects from the pooled control group expended a greater number of seconds viewing each slide they selected from the "alternative" category than did subjects in four of the six competing treatments. With regard to variable D, however, only subjects from the written booklet without reinforcement conditions spent a fewer number of seconds viewing each slide they selected from the "outcome" category than did individuals in the pooled control group. A plausible explanation can be advanced which would account for such apparently conflicting findings since the nature of the two categories of slides under consideration was different. With regard to the "alternative" slides, there were six slides involved and each one presented one possible solution to the hypothetical problem. In contrast, each of the 12 slides dealing with "outcomes" contained considerably more information and in a different form. In addition, "outcome" slides were of two types, possible positive and possible negative outcomes for each of the six alternative solutions; and each slide presented several possible outcomes possessing varying probabilities of occurrence. The outcomes and the subjective probability of occurrence of each alternative had to be weighed against each other and against possible consequences and probabilities presented in other slides. Further, each subject had to contrast outcome information against additional information available concerning the problem and the problem solver. One possible ramification of these differences between

the two slide categories might have been that the sophisticated well-trained problem solver tended to look at more "alternative" slides (but would give relatively little time to such slides) than did an individual with less training. This would be the case due to two reasons. He might have been able to process faster the small amount of information presented, consequently giving few seconds of attention to the short expository statements found on the "alternative" slides. A second possible ramification might have been that he tended to give longer consideration to each "outcome" slide he chose, because he had knowledge that information in this slide category involved the more sophisticated aspect of the problem-solving process, such as studying the possible positive and negative outcomes resulting from the implementation of these alternatives. In other words, it is postulated that he knew that it was the information about possible outcomes that made the difference in which alternative was chosen, not the simple statement presenting the various alternatives. Utilizing this line of reasoning, the t-test findings from variables B and D would be expected to occur and would present no paradox. An extended discussion of the data from these two variables has been attempted not primarily because the results of the variables were the reverse of one another but because the results obtained presented a rather unique paradox in terms of what might have logically been expected if this difference had been recognized before the study was initiated.

The lack of significant results on variable I may have been partially due to the criterion measurement phase of the investigation acting as a treatment in the case of the baseline control group. While the baseline control group received irrelevant materials during the treatment period, their experience of working in the simulated problem-solving situations may have contributed to the rapid formation of perceptions that they

were receiving assistance in problem solving. Subsequently, these subjects would also have made fewer requests for assistance at the end of the investigation than they had made earlier. This paralleled the tendency of subjects in most of the other treatment groups and resulted in no treatment being significantly more effective than any other in reducing the number of requests for problem-solving assistance. To a lesser degree, the possible confounding effect of criterion measure administration also might have applied to the results from variable H. Aside from all the problems inherent in self-report data, if such a measure is used in future research of a similar nature, it would be advisable to obtain a measure of change in self-reported behaviors prior to the administration of any criterion measures that might have a training impact on the subjects.

Chi-Square Analyses. The failure of data from variable E to provide any statistically significant findings might have been due to the weak way in which the criterion was structured. Each individual had a 50% opportunity for making an acceptable response. Adequate measurement of personal problem-solving behaviors must take into consideration the solutions or products of problem solving, but more rigor must be employed in such measures. This could be accomplished by manipulating the available information to make the specific alternative solutions scalable in appropriateness in order to get sufficient discriminative power to separate well-trained from less well-trained problem solvers. In its present form, this criterion showed no significant difference among the number of subjects in each treatment group who selected one of the acceptable solutions to the problem presented in the hypothetical problem simulation. It is assumed that such differences might have been revealed by a more sensitive instrument.

ANOVA Main Effects. The two largest F ratios in terms of reinforcement main effects resulted in data from variables A and C. Both of these variables involved some of the more simple problem-solving behaviors under investigation, (i.e., number of slides viewed from two categories). One possible explanation of such results is that reinforcement might have been substantially more effective in increasing the sheer number of rather simple responses but less valuable in producing more complex responses such as the time emphasis given to certain types of slide. Perhaps an even more likely explanation is the fact that in the reinforcement procedures, each subject was asked whether or not the social model should review additional alternatives. If a subject responded in the affirmative, then social reinforcement was provided. Since the reinforcement was provided in a manner directly connected with reviewing more alternatives, it should have been anticipated that its biggest effect would have been on this criterion behavior. Further, the most logical area of generalization for such an effect would have been on a similar behavior like the one involved in variable C. The results relative to variables A and C in Table 9 are clearly accounted for by such an explanation. In future efforts when an increased effect due to reinforcement is desired, it may well be that more of a direct connection must be made between the reinforcement and each specific behavior reinforced.

On the topic of media main effects, the media in this investigation were not only parallel or comparable but tightly dependent on one another. The audio-tape and written booklets were actually sound track replicas of the video-tape. Such an interrelationship could have worked to the disadvantage of the media. Of course, numerous improvements could have been made in the video-tape and it could be argued that it was in and of itself weak in its potential effect. However, equally plausible is the postulate that the audio-tape and written booklet approaches were handicapped by

having to conform unerringly to the content of the video-tape. Scores on media might have been just as comparable even if they had differed in content. In fact, to make the media as strictly parallel as was done in this investigation may have ignored some of the individual strengths of the media in question and actually blunted their effectiveness, causing a leveling effect across media. Designing the most effective written booklet, for example, might not involve simply typing a verbatim script of a video-tape production. Thus, the one F ratio reaching a desired level of significance (i.e., on variable C) might have been in spite of the blunted effects of the media rather than because of their individual differences in effectiveness. If the above explanations are valid, they might also explain the lack of F ratios reaching desired levels of significance relative to the main effect of sex.

ANOVA Interactions. The consistent lack of F ratios at the desired levels of significance relative to the factor of sex was also evident on the interaction data portrayed in Table 9. Of 16 possible interactions involving subjects' sex, only one, a sex x media interaction on variable H reached a desired level of significance ($p < .10$). The explanation most strongly suggested by the data is that sex is indeed not a learner characteristic that has a significant impact on the training of these behaviors. However, it also seems possible that sex effects did indeed exist but were masked by some of the confounding factors discussed earlier with regard to main effects.

It must be pointed out that the interaction on variable H which did attain a desired level of significance could well have been the result of chance factors. If such chance probabilities are ignored, a study of the nature of the interaction makes another inference plausible. It may have been possible that among males the dramatic nature of the video-tape and

audio-tape presentations influenced subjects' self-reporting of problem-solving behaviors. In data from both the with and without social reinforcement conditions, the order of media effect among males was clearly video-tape, audio-tape and lastly, written booklet. On this variable at least, it seemed to support the notion that dramatic and audio-visual stimulation is necessary to hold the attention and interest of male subjects, possibly because of the aversiveness reading may have for many of them. Without social reinforcement, the order of media effect was completely reversed from that among males, and the addition of reinforcement did not fully bring that order of effect into line with that found among male subjects. The finding that the written booklet was a much more powerful approach with females would support the notion that girls are more likely to react favorably to written material and do not need the rather dynamic approach which seemed to be more effective with boys. It could further be argued that cariable H was closest to students' real-life problem-solving performance than any of the other criteria derived from simulations. Thus the results on this variable would have particular importance.

The second order interaction associated with variable H was very difficult to interpret. Without the visual component in the presentation, the females seemed to respond better without reinforcement being added to the treatment. Only reasoned speculation can be offered as a tool for discovering possible causes of such a result. The above second order interaction may have been the result of a negative reaction to interruptions in the presentation. Such results also could have been due to sex differences in attention span or the degree of identification elicited by the listening and reading approaches. For example, female subjects may have been more used to reading stories about people of their own age. Also, while they perhaps were more used to interruptions in a visual presentation, because of their

experiences viewing television commercials, female subjects may have experienced more resentment toward the interruptions occasioned by reinforcement procedures injected throughout the listening or reading experiences.

Similar difficulties in interpretation surrounded the other second order interaction found in Table 9. On variable G the introduction of reinforcement was positive in the case of video-tape among males, and the same addition to video-tape brought about a decrease in effect among females. No plausible explanation can be offered for these results at present. Variable G dealt with the pattern of information selection in the Personal Problem Simulation and points were awarded in this criterion on the basis of both the number of alternatives about which some information was selected and the amount of information investigated about each selected alternative (cf. Appendix K). It seems possible that the giving of reinforcement to subjects for verbally stating that the social model should consider more alternatives was effecting in a rather oblique manner the pattern of information selection being made by subjects in the Personal Problem Situation. This effect, whatever its precise nature, was rather consistent but was reversed between the sexes (cf. Table 8).

The final interaction to be accounted for appeared in data from variable A. The written booklet clearly benefitted more than did any other treatment from the addition of social reinforcement procedures. This same effect was noted to a lesser extent in several other instances, especially on variable C. Such results could well have been due to benefits resulting from the breaking up of extensive written material with pauses and brief changes of activity. Under such conditions any negative reactions subjects might have had to extended reading activities might have been minimized.

Additional Potential Influences upon Results. The possibility that the nature and content of some criteria used in the investigation exerted a confounding effect upon the results has been noted earlier. In addition, other factors associated with the study may have contributed to the specific results obtained. For example, the necessity of administering all criterion measures in a single session may have affected the responses of subjects. Particularly when simulations were included, the level and length of concentrated effort which was required of each subject might have resulted in boredom, random or negative responses. This concentration of criterion administration might have introduced a leveling or equalizing effect across treatment conditions which would mask the superiority of a particular treatment. Perhaps an additional plausible postulate for artificial changes in problem-solving behaviors was that some subjects increased their effectiveness due to the freshness of the concepts and material presented as part of the criteria and due to transfer of learning from one criterion task to another. At the same time, the performance of other students might have deteriorated due to fatigue or loss of interest. The latter effect might have been particularly true of bright subjects who grasped the concepts and behaviors early in the training experiences and who viewed much of the subsequent training and criterion experiences as redundant and boring. Another possible factor confounding the results for the control subjects is one that was noted earlier. Many of these subjects might have perceived during the criterion phases of the investigation that they were finally getting the help they requested and were through with what appeared to be the boring materials given to them during the training itself.

One element (i.e., the script) was held in common by six of the treatment strategies. It might have been that the script itself was inadequate from the standpoint of clarity or interest stimulation. This "weak link" in the treatment "chain" might have made a significant contribution to a sparseness of significant results at the desired levels. Other possible limitations in this study might have been that inappropriate criteria were selected for the problem-solving skill areas of concern or the criterion instruments employed might have been inadequate in their sensitivity to the incidence of the specific behaviors related to the selected criteria. Table 10 reports the intercorrelations among all the criterion measures employed in the study. While possible issue of whether or not the most appropriate criterion measures were formulated and employed is a question for further investigation, an intercorrelation matrix of all nine dependent variables revealed that the variables were indeed for the most part measuring different things. The highest intercorrelation between variables is found between the number of slides presenting possible outcomes of alternative solutions which were viewed by the subject (variable C) and the relation between the number of seconds spent viewing such slides and the total number of seconds spent viewing slides of any kind. The prime contributor here is of course that in most cases the greater number of "outcome" slides watched by the subject, the greater amount of his total viewing time was spent viewing outcomes. This is then a natural relationship between these two variables. Much the same can be said of the .712 correlation between the two parallel criterion measures concerning alternative solutions in the Hypothetical Problem Simulation, (variables A and B). Some outcomes of criterion measures have already been noted and suggestions for improvements in them and in the statistical procedures employed will be made in Chapter IV.

Table 10

Intercorrelations of Nine Dependent Variables

Dependent Variable	A	B	C	D	E	F	G	H	I
A. Number of viewed slides presenting a possible alternative problem solution.	1.000	.712	.590	.483	.156	.096	.040	.147	.059
B. Time given to slides presenting alternatives in relation to total time viewing all slides.	.712	1.000	.118	.172	.108	.168	.069	-.020	- .025
C. Number of viewed slides presenting information on the possible outcomes associated with the implementation of particular alternatives.	.590	.118	1.000	.870	.092	.022	.026	.085	.026
D. Time given to slides presenting information on the possible outcomes of alternatives in relation to total time viewing all slides.	.483	.172	.870	1.000	.067	.016	.020	.052	.025
E. Rated appropriateness of the alternative selected as "best."	.156	.108	.092	.067	1.000	-.062	-.088	-.054	.001
F. Number of hypothetical individuals (i.e., alternatives) about whom some information was selected.	.096	.168	.022	.016	-.062	1.000	.814	.287	.198
G. Rated efficiency of information packet selections within and across hypothetical individuals (i.e., alternatives).	.040	.069	.026	.020	-.088	.814	1.000	.267	.143
H. Net increase (i.e., pre- and post-treatment) in each subject's self-reports of desirable personal problem-solving behaviors.	.147	-.020	.085	.052	-.054	.287	.267	1.000	.502
I. Net decrease (i.e., pre- and post-treatment) in the number of written requests for assistance with personal problem-solving behaviors.	.059	-.025	.026	.025	.001	.198	.143	.502	1.000

Only two other intercorrelations indicate more than 25% of the variance in scores on any two variables being held in common by these variables. One of these, a .59 intercorrelation, indicates an association between the number of "outcome" slides and the number of "alternative" slides viewed by each subject. The other such intercorrelation (.50), indicates that the criterion measure assessing the changes in the self-reported problem-solving behavior of each subject and that measure assessing the change in the number of written requests for problem-solving assistance made by each subject, (variables H and I), may to some degree be measuring the same things. This correlation is probably due to the fact that certain types of responses to some of the statements on the Checklist for Solving Problems in Real Life were used in the formulation of both criterion measures. Despite the particular intercorrelations discussed above, it appears that each of the dependent variables does measure a separate phenomenon. It should be noted that no test-retest reliability estimates are at present available, however. Some outcomes of criterion measures have already been noted and suggestions for improvements in them and in the statistical procedures employed will be made in Chapter IV.

An attempt has been made in this chapter to present a concise review of the results obtained in this investigation including their relationship to the hypotheses proposed prior to the study. Subsequently, several plausible explanations for, and factors influencing, these results have been discussed. Chapter IV in addition to summarizing the investigation will focus on conclusions and implications which might be drawn from these results.

IV. SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

Problem

Problem situations (i.e., those situations in which the appropriate or optimal response is not immediately obvious) are frequent and recurrent throughout life. A wide variety of events, internal and external to the individual, have been hypothesized to occur when a person faces such situations. Until the past decade relatively little consistent or programmatic effort was expended in thorough exploration of problem-solving behavior. From a historical perspective, Gestalt psychology, the psychometric movement, research in human learning, and information processing theory including work in computer simulation have been major influences upon both the theorizing and research carried out in relation to human problem solving.

Guidance has often been viewed as having a major responsibility in American education for assisting young people to be effective personal problem solvers. Guidance programs have been charged with this responsibility primarily due to inferential evidence which has implied that adverse effects befall people with inadequate problem-solving skills, especially in a rapidly changing, cognitively complex society such as our own where the quantity and difficulty level of the real-life problems confronting most individuals have rapidly increased. However, the abundance of previous research in human problem solving has been predominantly laboratory-oriented and has dealt primarily with problems far removed from the real-life choice situations of daily life. In addition, and perhaps not unrelated

to this research deficit, is the fact that a study of guidance-oriented research suggests that there has been inadequate progress toward the priority goal of guidance, assisting individuals to become effective personal-problem solvers.

Rationale and Strategy

Substantial evidence can be marshalled to support the notion that human problem-solving behavior is learned and is, therefore, subject to modification through training. Since the prime interest in this study was the development of techniques for training individuals to utilize effective problem-solving behaviors, the initial strategy was to study available models of problem-solving behaviors in order to ascertain what behaviors were involved in the process and to examine attempts to train these or similar behaviors. Such an investigation revealed six rather basic skill areas related to problem solving in real life, each of which was composed of several more specific behaviors. Previous efforts to train these and similar behaviors seemed to focus on educational and vocational decisions to the virtual exlusion of other life areas. Evaluative data on the effectiveness of the efforts were rare; they lacked clear objectives, specific facilitative learning experiences and criterion measures directly related to their objectives. Individual research studies proved somewhat more useful in producing specific problem-solving behaviors. Clues were gleaned from such studies which provided indication of what psychological and physical factors effect human problem solving and what might be some potential training strategies worth exploring. Representative examples of such strategies involved social modeling, the use of reinforcement, and direct exhortative approaches. The research in this area of investigation,

however, was anything but systematic and research findings were isolated and often apparently unrelated to one another. The necessity of measuring problem-solving behavior has brought about great controversy, with the controversy revolving around a product vs. process dichotomy. Some researchers suggested that it was the solution arrived at, or whether or not the solution worked, that determined the quality level of the problem-solving skill; while others stoutly maintained that it was the process that was of importance, not the chosen solution or the ultimate results of problem solving. The few available instruments designed to measure problem-solving behaviors reflected this controversy. They tended to weight the problem solution selected by subjects as more important than the process subjects used in selecting a solution, though attention was sometimes given to one or two process behaviors. No available instruments came very near to assessing both how individuals dealt with problems in their own lives and the nature of the problem solutions. However, it was accepted as a basic premise in this study's rationale that an adequate measure of real-life problem-solving behaviors must concern itself with both process and product.

Design

A problem-solving skill postulated to be of key importance (i.e, the consideration of alternative problem solutions prior to making a decision) was selected for an exploratory investigation aimed at providing direction for optimal training strategies for a proposed problem-solving training program. Specific questions under investigation included: (1 Which medium of presentation (video-tape, audio-tape, or booklet) is the most effective? (2) Does the addition of social reinforcement procedures duing training heighten the effectiveness of a treatment regardless of the meium employed?

(3) Is there a differential effect of particular treatments dependent on the sex of the subject being trained? Eight treatment groups were formulated including video-tape social modeling, audio-tape social modeling, and a modeling strategy utilizing written booklets. Three treatments parallel to these except that they incorporated social reinforcement of desirable subject verbal statements during training were also employed. In addition, there was a condition in which subjects received a live lecture on the topic and a control treatment in which subjects were exposed to programmed materials on descriptive statistics.

Criteria

A total of three criterion devices yielding nine criteria were derived from two problem-solving simulations and a self-assessment device. In the first of these simulations, the subject's task was to assist a hypothetical individual to solve a real-life problem. Information concerning the problem, the problem-solver, alternative courses of action that could be taken, and the possible outcomes of implementing the various alternatives were available on 35mm slides. For 10 minutes subjects were free to view whatever they felt would be the most useful slides for solving the problem. At the end of that time, they were asked to indicate which alternative course of action they felt the hypothetical character should take. In the second simulation each subject was given the task of selecting one of a number of available individuals to assist him in solving a current life problem of his own choosing. Information on these hypothetical individuals was made available through photographs and tape cartridges placed in information packets. Subjects were faced with a 10-minute limitation. Subjects were asked at the conclusion of that time to indicate which individual they had chosen to assist them. Following this simulation each subject filled out the self-report device noted earlier. Criteria derived from the first simulation in which each subject assisted a hypothetical person to solve a personal problem

included: (A) the number of slides viewed by the subject presenting alternative problem solutions, (B) the time given to slides presenting alternatives in relation to the total time viewing all slides, (C) the number of slides viewed by the subject which presented information on the possible outcomes of implementing various alternatives, (D) the time given to slides presenting possible outcomes of alternatives in relation to the total time viewing all slides and, (E) the rated appropriateness of the solution selected as "best," (the available information was manipulated in such a manner as to make three of the six possible alternatives quite acceptable).

From a second problem-solving simulation in which each subject was to select an individual to assist him in solving a personal problem of the subject's choice two more criteria were derived. The criteria were (F) the number of alternative individuals about whom some information was selected and (G) a measure of the amount of information on each alternative which was considered. Finally, two further criteria came from a readministration of a self-evaluative problem-solving behavior assessment device. These criteria were (H) positive changes in self-reported problem-solving behaviors and (I) net decrease in the number of written requests for problem-solving training.

Hypotheses

1. Subjects assigned to the video-tape with reinforcement treatment will score higher on the criteria than will subjects assigned to any other treatment condition.
2. Subjects assigned to the three treatment conditions involving social reinforcement will score higher on the criteria than will subjects exposed to similar conditions not involving social reinforcement.

3. Subjects assigned to the two video-tape treatment conditions will score higher on the criteria than will subjects assigned to the two treatments involving written booklets or to the two treatments involving audio-tape, or to a treatment involving an oral lecture, or to the baseline control condition.

4. Subjects assigned to the two audio-tape treatment conditions will score no differently on the criteria than will subjects assigned to the two treatments involving written booklets.

5. Subjects assigned to the oral lecture treatment condition will score higher on the criteria than will subjects assigned to the baseline control treatment.

No interactions between media, the use of reinforcement, and the sex of subjects were hypothesized.

Experimental Procedures

In a suburban San Francisco Bay Area high school, all eleventh graders responding positively to a device designed to assess their need and desire for problem-solving training formed a pool from which 128 students were randomly assigned by sex to one of the eight treatment conditions noted earlier. Convening in separate rooms within the high school counseling suite at various times during a four-day period, each group received the same opening and closing remarks prior to, and after, the administration of its treatment procedure. Approximately one week following completion of treatment administration, collection of criterion data was begun. Students were summoned individually on a random basis and were exposed to all three criterion measures within a 30-minute period. This phase of the investigation consumed a total of eight school days. The problem-solving simulations were followed by second administration of the Checklist for

Solving Problems in Real Life. In the first of these simulations, the subject's task was to assist a hypothetical individual to solve a real-life problem. Information concerning the problem, the problem-solver, alternative courses of action that could be taken, and the possible outcomes of implementing the various alternatives was available on 35mm slides. For 10 minutes subjects were free to view whatever they felt would be the most useful slides for solving the problem. At the end of that time, they were asked to indicate which alternative course of action they felt the hypothetical character should take. In the second simulation, each subject was given the task of selecting one of a number of available individuals to assist him in solving a current life problem of his own choosing. Information on these hypothetical individuals was made available through photographs and tape cartridges placed in information packets. Subjects were faced with a 10-minute limitation. Subjects were asked at the conclusion of that time to indicate which individual they had chosen to assist them. Following this simulation, each subject filled out the self-report device noted above.

Data Analysis and Results

BMD 07D was run initially in order to secure a check on the accuracy of the data recorded. This program provided, in addition to means and standard deviations, histograms and ranges for each treatment group of each criterion measure as well as a one-way analysis of variance on each criterion. Subsequent to this preliminary analysis, due to the dicotomous distribution of data on variable E, these results were dealt with separately via chi-square techniques. t-test procedures were employed to compare the effects of the lecture group and the baseline group on each of the remaining measures.

Since no significant differences on any of the criteria appeared between these two types of control groups. a "pooled" control group composed of these two treatment conditions was used. Analyses included a comparison of mean effects of the pooled control with those of each of the remaining treatments on each criterion measure through further t-tests. Finally, three-way (sex x reinforcement x media) analyses of variance which sought to uncover significant main effects and interactions involving these three factors were conducted on data from all treatments except the pooled control.

Even when desired levels of significance were set at $p<.10$ and $p<.05$), results produced little support for the five hypotheses. Regarding hypothesis one, (i.e., that subjects assigned to the video-tape treatment will score higher in the criteria than those assigned to any other treatment), on only two of the nine criteria was any support obtained, though one of the measures (i.e., the number of slides viewed by the subject which presented the possible outcomes associated with various alternatives), on which some support was indicated was one of the criteria of prime concern in the study. Somewhat more supportive evidence was uncovered with respect to hypothesis two, (i.e., that subjects assigned to treatments employing social reinforcement procedures would score higher on the criteria than would subjects in similar treatments not employing social reinforcement). On data from the prime criterion of interest, the number of "alternative" slides viewed by the subjects in the first problem-solving simulation, this hypothesis was supported at the $p<.10$ level of significance. On one other measure, the number of "outcome" slides viewed, a strong trend ($p<.25$) in the predicted direction on two criterion measures, (i.e., the number of slides viewed by a subject which presented information on the possible outcomes associated with each alternative *and* positive changes reported in personal problem-solving behaviors), was uncovered. Though inspection of the data relative to hypothesis four revealed what appeared to be differences of considerable

magnitude, on only one variable, (i.e., the number of slides viewed by the subject which presented possible outcomes associated with each alternative, did the difference reach a desired level of significance. Finally, t-test procedures comparing the live lecture strategy with the baseline control group provided no support for hypothesis five. Though on a majority of criteria the lecture group appeared to be superior, these differences at no time reached the desired levels of statistical significance.

Contrary to what was hypothesized, this study's major findings of significance concerned first and second order interaction effects. On a criterion of major interest, (i.e., the number of slides viewed by the subject which presented alternative problem solutions), a reinforcement x media interaction was uncovered. Higher criterion scores among subjects in written booklet treatment groups when social reinforcement was introduced was the primary element here. The apparently greater effectiveness of the video-tape strategy for males in contrast to females and a similar effect for the written booklet for females in contrast to males contributed to a significant media x sex interaction on variable H, (i.e., the positive changes in self-reported personal problem-solving behavior). Two second-order interaction effects of a similar nature and at desired levels of significance were found. In regard to variable G, (i.e., the rated efficiency of information packet selections within and across alternatives), when reinforcement was added to each medium of training, reversed effects resulted dependent upon sex. For males, video-tape and written booklet seemed more effective without reinforcement, whereas audio-tape was more effective with reinforcement. Opposite effects were noted among females. Finally, opposite effects were also found dependent on sex when reinforcement was added to each media on variable H, (i.e., positive changes in self-reported personal problem-solving behavior). For males, reinforcement resulted in lower scores within the context of a video-tape strategy, and a positive effect in the case of

audio-tape and written booklet media. Again, effects among female subjects were opposite to the results for males.

Conclusions

Initially, conclusions closely tied to the hypotheses originally formulated will be set forth. Following this, additional conclusions felt to be warranted by the data will be presented.

1. With regard to hypothesis one, no one training strategy of those investigated proved to be optimal for helping students to acquire effective problem-solving behaviors. The results of this study both from analyses of variance and from t-test procedures lead to the conclusion that a number of training strategies may be useful in the training of personal problem-solving behaviors. The most useful strategy seems to depend on the context in which it is being used. This involves factors such as the particular behavior to be trained and characteristics (e.g., sex) of the subjects being trained.

2. Providing social reinforcement for desirable verbal participation by subjects during training did have an effect upon some problem-solving behaviors examined by this study, but the pattern of effect was complicated and not entirely consistent. It appeared that the effect of reinforcement was confined to the specific behaviors for which the reinforcement was given and to the behaviors closely related to them. Further, just what was causing such effects cannot be precisely specified. Perhaps the effects which were in the predicted direction were the result of the training presentation being broken up by reinforcement into shorter, more assimilable units of information. Maybe the big factor was that immediate feedback leading to subjects' knowledge of their correct responses was provided by the reinforcement. On the other hand, it might have been that

the human element of having interaction between individuals carried a variety of connotations to the subjects including, perhaps, a perception that they were important enough to be worked with personally in the problem-solving training.

With regard to the consistency and pattern of reinforcement effects, it appeared that the introduction of social reinforcement procedures in response to desirable verbal participation by subjects during training usually had a positive effect upon both video-tape and written booklet approaches and reverse results with regard to the audio-tape on several criteria. In fact, this reversal was often the major barrier to a lack of statistical significance at desirable levels being attained in favor of treatments using reinforcement. While the positive effect of social reinforcement was relatively consistent and substantial when paired with the video-tape modeling strategy, the effect was just as consistent and in several cases, was much more pronounced when paired with the written booklet materials. These results from the analysis of variance procedures and the lack of clarity as to the particular elements in the social reinforcement procedures which contributed to the effects of reinforcement make it necessary to carefully delimit our conclusion. In this light it can be concluded only that the reinforcement procedures did produce an added effect at significant levels upon those specific problem-solving behaviors (e.g., the number of slides viewed by the subject which presented alternative problem solutions which were similar to the specific behaviors for which the reinforcement was administered.

3. No training medium was found to be most effective irrespective of either the specific problem-solving behaviors being assessed or such variables as the use of reinforcement and the sex of the subjects. Thus, like the question of specifying the optimal training strategy, the media

reasons for such a result was the inconsistent efficacy of both treatments. The standard deviations of both approaches were often larger than most, or in some cases all, of the reamining treatments acorss the criteria. Thus, some people might have benefitted from each of these approaches but their overall effectiveness was reduced because these positive changes were negated by the lack of change, or the negative changes, made by other subjects in these treatment groups, though there may well have been chance fluctuations. It cannot be concluded that the lecture treatment should necessarily be removed from consideration as an effective training strategy. Data from Table 1 indicate that on several variables the lecture strategy was indeed more effective than the control but not at desired levels of significance. Any conclusion relative to this finding must be limited to pointing out that programmed materials in written form on an apparently unrelated subject elicited responses on the dependent variables not significantly different at desired levels from a live oral presentation concerning personal problem solving.

6. Evidence resulting from t-test analysis conducted as an extension of Hypothesis 5 provided findings that proved difficult to explain. The pooled control condition fared well when its effects were compared with those of each of the remaining six treatment groups on each of the eight criteria. It was never least effective, usually of average effectiveness, and once or twice was most effective. Unless such a finding can be adequately explained, the idea of building a training program for problem-solving behaviors would be difficult to support and one should be cautioned against the conclusion that the control strategy was indeed a good treatment strategy. It may well have been the case that the ceiling on the criterion measures was too low. A considerable amount of problem-solving behaviors were exhibited in all of the treatment groups and the criterion measures may have lacked the necessary sensitivity to discriminate between effective and ineffective

problem solvers. In such circumstances the amount of criterion behavior occurring in the control treatment might be comparable in quantity to that occurring within competing treatments. Several suggestions for eliminating this possible deficiency are presented in a subsequent discussion of implications. A related point which has been touched upon previously is that though the live lecture and baseline control treatments did not differ significantly at the desired levels, in effect, the lecture group often did score somewhat higher on several of the criterion measures. Thus, when this condition was pooled with the baseline control condition, a somewhat stronger control group resulted for further comparisons.

Two final conclusions must be made with more reservation that those presented previously. These two additional conclusions are based primarily on data trends.

7. Though there appeared to be differences in treatment effectiveness attributable to sex, most of these did not reach desired levels of statistical significance. In spite of the fact that sex did not produce any main effects at the desired levels of significance, it cannot be concluded that it is of no consequence in training problem-solving behaviors. In studying interaction effects for example, it was revealed that while both video-tape and the written booklet with reinforcement served equally well among males in stimulating more choices of alternative slides (i.e., variable A), the written booklet was easily more effective in stimulating such behavior among females. In one or two instances males seemed to respond to the more dynamic approaches (i.e., video-tape) and often seemed to be less affected by the introduction of social reinforcement procedures. Video-tape proved to be significantly more effective in eliciting positive changes in self-reported personal problem-solving behaviors with males than with females while audio-tape and written booklet approaches were about equally effective with both sexes. Sex is not a major determinant of whether or not a treatment is

effective, but it may interact in subtle ways with social reinforcement and media to produce increases or decreases in particular problem-solving behaviors exhibited by subjects. The interactions found were not hypothesized in advance and would need to be confirmed by further research.

8. We have not yet found any optimal strategy for training effective personal problem-solving behaviors. Either such a strategy does not exist, or it was not included in those strategies implemented in the present investigation, or, if included, the design and instrumentation used in this investigation were not sufficiently sensitive to uncover such a strategy.

Implications

Rationale and Training Strategies.

Subjects in treatments utilizing social reinforcement techniques, especially in conjunction with the video-tape and written booklet, more often attained higher scores on criterion measures than did subjects in treatments not including such reinforcements.

While these findings supporting the usefulness of social reinforcement in problem-solving training were not consistent, sufficient evidence was produced to warrant the further exploration of such procedures in a proposed training program. Is "knowledge of results" the reinforcer, is it social approval, is it frequent changes in activity, or is it the more personal relationship with the experimenter?

The individuals administering the training materials and providing the reinforcement were relatively untrained. No more than an hour or two was spent in explaining to the experimental assistants how to handle the treatment sessions and how to carry through the reinforcement procedures. Possibly in school settings counselor aides or similar para-professionals could handle such a training program in order to avoid involving highly

paid individuals trained at the professional level. The results of this study also seemed to suggest that in order to be effective reinforcement must be closely tied to the specific behavior under investigation. This finding along with the indication that there seems to be no one optimal training strategy for eliciting all problem-solving behavior might suggest that considerable effort will be needed to devise appropriate training strategies to achieve sophisticated and complex problem-solving behaviors. We may need to devise an optimum strategy for each separate problem-solving behavior rather than with attempting to discover one strategy which is best for training all problem-solving behaviors generally.

Additional research is needed into exactly what behaviors contribute to effective personal problem solving. It would be wise to undertake an intensive study of effective and ineffective problem solvers in order to uncover which behaviors differentiate the two groups. Possibly the model of effective personal problem solving used in this investigation needs modifying.

The selection of media for training presentation seems partly dependent upon whether or not reinforcement procedures are included in the training of particular behaviors. It has been previously noted that written booklets rather cibsistently increased most in effect as a result of the introduction of social reinforcement procedures. Such findings would seem to indicate that written booklets are not to be ignored in future searches for an effective training medium. Written materials invariably are more economically feasible to produce than more involved audio-visual media presentations.

A recurrent issue in the development of almost any training program is the accommodation of individual differences in learning styles by offering a variety of training strategies. If the characteristics of those students for whom each training strategy was effective could be isolated perhaps even

lecture might be an additional useful strategy in an arsenal of strategies designed to meet a wide variety of learner chartcteristics. The speculation is made regarding a lecture approach however that, relative to other treatment strategies, the lecture might be more useful for stimulating rather simple straight-forward problem-solving behaviors, e.g., looking at several alternative solutions to a problem when they are placed before you) while its use in training more sophisticated concepts, (e.g., studying the possible outcomes of implementing each alternative) might be more questionable.

This investigation's attempt to uncover the effect of sex differences in training has valuable implications. Inspection of the data shows on four measures that the video-tape modeling strategy not containing reinforcement was apparently more effective for males than it was for females. Similarly, five measures revealed an advantage that a non-reinforcement audio-tape approach had with females. Social reinforcement procedures did add to the effect of various treatment strategies. The same procedures might have also produced a tendency toward equalization of treatment effects between sexes. That is, social reinforcement may counter-balance sex effects, thus eliminating the main effect due to sex. In such cases, the main effect due to sex might be insignificant with the sex x treatment interaction still quite significant. Though there is some evidence of this occurring in the present study the instances in which this would and would not be the case should be further identified by future problem-solving research.

The data concerning the relatively high frequency of problem-solving behavior occurring in the pooled control treatment condition must be dealt with. It may be that personal problem-solving behaviors are emitted quite frequently by most students and that actual emission of appropriate behaviors is not the barrier to effective problem solving. Or it may be that the behaviors truly associated with effective problem-solving are not being measured. A third interpretation will suggest a reprint of

of criterion measures to widen the range in the frequency of appropriate behaviors which can be accommodated since the ceiling on the measures employed in the present investigation may have been too low.

Research Design.

A main element of the research design was the manner in which the treatment strategies were designed. One feature, the script, was held in common by six of the treatment strategies used in this investigation. It may have been that the script itself was inadequate from the standpoint of clarity, interest stimulation, organization, or in regard to a number of other variables. This "weak link" in the treatment "chain" would have made a major contribution to a sparseness of results at the d-sired levels of significance. It may be that the most powerful features of particular training media were muted and the media made more equal in their effect by forcing them to adhere to the same script.

The criterion measures employed in the study may have been inadequate in sensitivity to the specific behaviors being measured. It is also possible that the quality of instrumentation used in implementing the criteria resulted in the measurement of behaviors other than those which would have been most appropriate. One criterion, the selection of an appropriate solution in the hypothetical problem simulation has already been noted in this regard. The behavior itself may be worthy of measurement, but the manner in which the measure was formulated was inadequate. Each subject had a 50% opportunity by chance toscore high on the measure.

Criterion measures designed to assess human problem-solving behaviors need to be improved. First, if it is considered important to assess the quality of the problem solution selected by the subject, problem-solving simulations, and (primarily the ifnormation available in such situations), must be controlled in such a manner as to make the alternative problem solutions scalable in terms of appropriateness. The instrumentation of the

dependent variable regarding the solution chosen (variable E) included in this investigation was woefully inadequate, the subject having through the very nature of the measure a 50% chance of selecting an appropriate solution. This is a clear example of inadequate assessment procedures being used to measure a very appropriate criterion variable. Second, if any measures of change in self-reported problem-solving b ehaviors are sought, in future studies the effect of criterion experiences must be partialled out and several data gathering points over time should be included. Third, research on phenomenon such as real-life problem solving almost demands the administration of multiple criterion measures on occasions separated by meaningful time intervals. The administrative necesities which forced a single session of data collection in this study seemed to have an unspecified but confounding effect upon the results. Additionally, comparable measures should be administered over time in order to provide feedback regarding enhancement or deterioration of the behaviors originally acquired and indicate needs for additional training experience. Such measures ahould include post-treatment measures spearated by at least one day or two in time and follow-up measures further removed in time which attempt to assess the transfer of the acquired behaviors to real life. These procedures are needed with regard to both pre- and post-treatment criterion measures.

Research on the training of complex behaviors such as those involved in personal problem solving may well demand use of a variety of criterion measures using divergent measurement approaches. This need for a more thorough and refined criterion effort is recommended on the basis of weaknesses in the criterion used in this investigation. Though the simulations which were developed for this study appear to have considerable promise for future problem-solving research, they must be elaborated to encompass additional specifiable behaviors associated with the consideration of alternative

problem solutions. One such behavior might be the rating of the desirability of each possible consequence associated with a particular alternative; and another, the estimating of the likelihood of occurrence of each outcome. Additionally, the simulations must be modified to be more aprallel. Each simulation should contain a dependent variable for each behavior of interest. Such is not now the case. For example, while the Hypothetical Problem Situation contained a measure of the consideration given to possible outcomes of each alternative, no comparable measure existed in the Personal Problem Situation. Lastly, it should be noted that some parallel simulations must be developed and refined to encompass all the effective problem-solving behaviors, not just those in one skill area, in order to ascertain profiles of development in a number of problem-solving skill areas over time. The severe criticisms broached above should not however be allowed to overshadow the fact that simulations still appear to be a promising vehicle for further assessment of problem-solving behaviors.

Attempts must be made in future research designs to discriminate more clearly between effective and ineffective problem solvers in order to assess the effects of various treatment strategies. A truly inactive control group should be instituted to attain an accurate record of baseline behavior on the dependent variables. In the present study, no such baseline data was available and the discriminations between treatment effects may have been blurred as a result. Second, pre-and post-measures might be employed more extensively to provide more information regarding the specific effects of exposure to treatment strategies. Analyses of covariance could then be appropriately employed to ascertain the effects of treatments relative to the subjects' characteristics and level of performance upon entering the program.

Experimental Procedures

In future experimentation related to human problem-solving training programs, more control needs to be established in order to prevent confounding social interaction effects among students during the time treatments are administered. Also, similar controls need to be employed during the period of time which both pre- and post-treatment criterion measures are administered. The present study may well have suffered due to the length of time that was needed to complete treatment administration, and the necessity of collecting criterion data from only one student at a time. The latter procedure was necessary but consumed a period of more than a week by the time all students had been assessed. Similar procedural control needs to be imposed to insure that the initial randomization of subjects' assignments to treatment groups is maintained. Irregularities causing deviations from the random assignment procedures which of necessity were followed in this investigation (e.g., shifts in the treatment to which a student was assigned and changes in the times at which particular groups were administered the assigned treatment) likely confounded the research results. Such irregularities impose limitations upon the power and generalizibility of these study's findings. The administration of most of the measures of problem-solving behaviors (especially the problem-solving simulations) should in future studies be counterbalanced as to the order of their administration and should be separated in time. This was not done in the present study. It is felt that there may have been confounding effects due to the order in which the criterion measures were administered. Some of these effects would take place within the behavior on particular subjects while other effects due to order might be spread across subjects but not in an equal or random fashion. Artifactual findings must thus result. Such effects might include subject fatigue, boredom, or elements in one or more

of the measures which serve to stimulate problem-solving behaviors among some subjects. The instigation of these improvements in experimental procedures would further remove the criterion measures from being perceived as tests or measures of performance. Some attempt should be made to specifically search out data on this possibility in future studies. No such attempt was made during the present study and it is highly likely some of the students did perceive the criterion measures as testing devices, particularly when they remember the length of time taken in criterion data collection. Lessening the probability that the criterion measures would be perceived by the subjects as measures of performance is important since measures of each subject's typical performance, rather than of their optimum behaviors that are sought. In other words, the effectiveness of the program lies in modifying what in fact the subjects do in their daily lives, not merely what they can do under favorable conditions when they know they are being asked to manifest what they have learned.

Even with improved criterion measures, it may be necessary to employ more sophisticated statistical procedures to ferret out the most important data which discriminate which discriminate effective from ineffective personal problem solvers. For example, some of the most meaningful data obtained from problem-solving simulations may be derived from the pattern of subjects' information selections. It might be postulated, for example, that a person well-trained in problem solving would select slides presenting alternative problem solutions earlier in his selection sequence than would an individual less well trained. If this is true, then statistical procedures involving pattern analysis should be recommended for further research concerning problem-solving behaviors. Additionally, the use of such techniques as analyses of covariance have been suggested previously in conjunction with the use of more pre-treatment measures.

Summary of Implications

The goal of providing each subject entering a problem-solving training program with experiences which will be optimal in assisting him or her to acquire and manifest effective behaviors when solving personal real-life problems is still far off. Further work must be done in validating the appropriateness and priority of the behaviors to be included in such a program; in developing and refining the administrative procedures, treatment strategies, and measurement devices; and in providing more complex and detailed analyses of subject treatment characteristics and criterion data. However, the net result of the investigation has been positive. Several behaviors in one problem-solving skill area have been trained with varying degrees of success, promising criterion measures have been developed, some differential effects of treatment strategies for producing particular behaviors have been uncovered, the effect of social reinforcement procedures in response to desirable verbal participation by subjects during training has been assessed, and the effect of subject sex upon the effect of various treatment approaches has been investigated.

Support for continued development of a program for training secondary school students in effective problem-solving behaviors has been gathered both from the writings of leading authorities in the guidance profession and from students in this study. Students felt they needed such training assistance and seemed to react positively to what was provided. Indeed, some control students reacted negatively when they perceived they were not receiving such assistance. Evidence indicated that future training programs should consider the use of human assistants to provide live social reinforcement during training for each particular behavior that is to be trained. Further, it appears that written booklet modeling approaches can, when appended with techniques such as social reinforcement, be quite

as effective for a large proportion of subjects as can video-tape modeling approaches in producing desired problem-solving behaviors. There are indications that semi-professional personnel, such as counselor aides, could be trained to handle the bulk of the duties associated with the implementation of a program of this kind. This would ease the economic and personnel press on schools desiring to put such a training program into operation. Particular attention must be paid in setting up training procedures to assess the subtle effect of such factors as subject sex upon the training of each behavior in the program. In the present study the influence of sex was much more pronounced when interacting with other treatment variables such as reinforcement than when studies as a main effect.

Research on the training of complex behaviors such as those involved in personal problem solving may well demand use of a variety of criteria using divergent approaches to the measurement of the phenomena under investigation. Criterion measures and the instrumentation of such measures must be refined in order to produce dependent variables which measure important problem-solving behaviors and which are instrumental in such a manner as to be sensitive to the occurrence of these behaviors. Improvements in research design will enable an increase in discrimination between effective and ineffective personal problem solvers. More vigorous experimental control will facilitate findings having greater generalizability and explanatory power.

However, monumental progress needs yet to be made before individualized training prescriptions can be made which will provide each student with the optimal amount and quality of experience he needs to achieve competence as an effective personal problem solver. Even then, the ultimate test of a personal problem-solving training program will continue to be, not research cleanliness,

nor the responses of each student in a simulation experience but rather the degree to which each student actually exhibits effective problem-solving behaviors as he daily confronts the never ending chain of personal problems which inevitably greet him in his own life.

REFERENCES

Anderson, R. C. & Ausubel, D. P. (Eds.) *Readings in the Psychology of Cognition.* New York: Holt, Rinehart & Winston, 1965.

Asch, S. E. The doctrine of suggestion, prestige, and imitation in social psychology. *Psychological Review*, 1948, 55, 250-277

Bandura, A. Vicarious processes: A case of no-trial learning. In L. Berkowitz' (Ed.) *Advances in Experimental Social Psychology.* Vol. 2. New York: Academic Press, 1965, 1-55 (a).

Bandura, A. Influence of model's reinforcement contingencies on the acquisition of imitative responses. *Journal of Personality and Social Psychology*, 1965, 1, 589-595 (b).

Bandura, A. & Kupers, C. J. Transmission of patterns of self reinforcement through modeling. *Journal of Abnormal and Social Psychology*, 1964, 69 (1), 1-9.

Bandura, A. & McDonald, F. J. Influence of social reinforcement and the behavior of models in shaping children's moral judgment. *Journal of Abnormal and Social Psychology*, 1963, 67, 274-281.

Bandura, A. & Walters, R. H. *Social Learning and Personality Development.* New York: Holt, Rinehart and Winston, 1963.

Blank, S. S. & Covington, M. Inducing children to ask questions in solving problems. *Journal of Educational Research*, 1965, 59, 21-27.

Brehm, J. W. & Cohen, A. R. *Explorations in Cognitive Dissonance.* New York: Wiley, 1962.

Brim, O., Glass, D. E., Lavin, D. E., & Goodman, N. *Personality and Decision Processes.* Stanford: Stanford University Press, 1962.

Bross, I. D. *Design for Decision.* New York: Macmillan, 1953.

Camilleri, S. F. & Berger, J. Decision-making and social influence: A model and an experimental test. *Sociometry*, 1967, 30, 365-378.

Coleman, J. S. *Equality of Educational Opportunity.* U. S. Dept. of Health, Education, and Welfare. U. S. Government Printing Office, 1966.

Dewey, J. *How We Think.* (Rev. Ed.) New York: Heath, 1933.

Dilley, J. S. Decision-making ability and vocational maturity. *Personnel and Guidance Journal*, 1965, 44, 423-427.

Dixon, W. J. (Ed.) *BMD Bromedical Computer Programs.* University of California Publications in Automatic Computation #2. Los Angeles: University of California Press, 1967.

D'Zurilla, T. J. & Goldfried, M. R. *Cognitive Processes, Problem-Solving, and Effective Behavior.* Paper presented at American Psychological Association Convention, San Francisco, California, September 1968.

Epstein, R. Aggression toward outgroups as a function of authoritarianism and imitation of aggressive models. *Journal of Personality and Social Psychology*, 1966, 3, 574-579.

Evans, J. R. & Cody, J. J. Transfer of decision-making skills learned in a counseling-like setting to similar and dissimilar situations. *Journal of Counseling Psychology*. In press.

Fiegenbaum, E. A. & Feldman, J. (Eds.) *Computers and Thought*. New York: McGraw-Hill, 1963.

Foreland, G. A. Epilogue: Constructs and strategies for problem-solving research. In B. Kleinmuntz (Ed.) *Problem Solving: Research, Method, and Theory*. New York: John Wiley & Sons, Inc., 1966, 355-385.

Gagne, R. M. Problem-solving and thinking. In P. R. Farnsworth and Q. McNeman (Eds.) *Annual Review of Psychology*, 1959, 10, 147-173.

Gagne, R. M. *Conditions of Learning*. New York: Holt, Rinehart and Winston, 1965.

Gagne, R. M. Human problem solving: Internal and external events. In B. Kleinmuntz (Ed.) *Problem-Solving: Research, Method, and Theory*. New York: John Wiley & Sons, Inc., 1966, 127-149.

Gelatt, H. B. Decision-making: A conceptual frame of reference for counseling. *Journal of Counseling Psychology*, 1962, 9, 240-245.

Gelatt, H. B. & Varenhorst, B. B. A decision-making approach to guidance. *The Bulletin of the National Association of Secondary School Principals*, 1968, 52.

Gibby, R. G., Jr., Gibby, R. G., Sr., & Hogan, T. P. Relationships between dominance needs and decision-making ability, *Journal of Clinical Psychology*, 1967, 23, 450-452.

Ginzburg, E., Ginzburg, S. W., Axelrad, S. & Herma, J. L. *Occupational Choice: An Approach to a General Theory*. New York: Columbia University, 1951.

Girshick, M. A. An elementary survey of statistical decision theory. *Review of Educational Research*, 1954, 24, 448-466.

Green, B. F. Intelligence and computer simulation. *Transactions of the New York Academy of Science*, 1964 Series II, 27, 55-63.

Green, B. F., Jr. Current trends in problem solving. In B. Kleinmuntz (Ed.) *Problem Solving: Research, Method, and Theory*. New York: John Wiley & Sons, Inc., 1966, 127-149.

Gribbons, W. D. Evaluation of an eighth grade group guidance program. *Personnel and Guidance Journal*, 1960, 38, 740-745.

Guilford, J. P. Factorial angles to psychology. *Psychological Review*, 1961, 68, 1-20.

Halpern, G. *The case development questionnaire: an information-search assessment technique.* Unpublished research memorandum. Princeton, New Jersey: Educational Testing Service, 1967.

Halpern, G. Assessment of decision processes. *Proceedings of the 75th Annual Convention of the American Psychological Association,* 1967, 361-362.

Hendrick, C., Mills, J. and Kiesler, C.A. Decision time as a function of the number and complexity of equally attractive alternatives. *Journal of Personality and Social Psychology,* 1968, 8 (3, Pt. 1), 313-318.

Hershenson, D.B. and Roth, R.M. A decisional process model of vocational development. *Journal of Counseling Psychology,* 1966, 13, 368-370.

Hilton, T.L. Career decision-making. *Journal of Counseling Psychology,* 1962, 9, 291-298.

Johnson, D.M. and Zerbolis, D.J. Relations between production and judgment of plot-titles. *American Journal of Psychology,* 1964, 77, 99-105.

Katz, M.R. *You: Today and Tomorrow.* Princeton, New Jersey: Educational Testing Service, 1959.

Kawin, E. *Middle Childhood.* Chicago, Illinois: University of Chicago Press, 1957.

Kohler, W. *The Mentality of Apes.* New York: Harcourt Brace, 1925.

Krumboltz, J.D. *Stating the Goals of Counseling.* Monograph #1, California Counseling and Guidance Association, 1966.

Krumboltz, J.D. Future directions for guidance research. In John M. Whitely (Ed.) *Proceedings of the Invitational Conference on Research Problems in Counseling Reevaluation and Refocus.* St. Ann, Missouri: Central Midwestern Regional Educational Laboratory, Inc., 1967, 199-219.

Krumboltz, J.D., Baker, R.D., and Johnson, R.G. *Vocational problem-solving experiences for stimulating career exploration and interest: Phase II.* Report of Project No. 7-0111, Contract No. OEG-4-7-070111-2890. Submitted to U.S. Commissioner of Education under the Provisions of Section 4(c) of the Vocational Education Act of 1963, 1968.

Krumboltz, J.D. and Sheppard, L.E. *The effect of a vocational problem-solving experience on career exploration and interest.* Unpublished mimeograph, Stanford University, 1966.

Krumboltz, J.D., Sheppard, L.E., Jones, G.B., Johnson, R.G. and Baker, R.D. *Vocational problem-solving experiences for stimulating career exploration and interest.* Report of Project OE 5-85-059. Submitted to the U.S. Commissioner of Education under the Provisions of Section 4(c) of the Vocational Education Act of 1963, 1967.

Lefkowitz, M., Blake, P.P. and Mouton, J.S. Status Factors in pedestrian violations of traffic signals. *Journal of Abnormal and Social Psychology,* 1955, 51, 704-705.

Lewis, J. D. A study of the effectiveness of three methods of teaching one segment of elementary political science. *Journal of Experimental Education*, 1964, 73-80.

Loughary, J. W. Tondow, M., Yabroff, W. W. & Bowman, C. W. *You: The Decision-Maker*. Chicago: Follett Publishing Company, 1967.

Lowe, H. & Steiner, D. Some effects of the reversibility and consequences of decisions on postdecision information preferences. *Journal of Personality and Social Psychology*, 1968, 8 (2, Pt. 1), 172-179.

Lumsdaine, A. A. (Ed.) *Student response in programmed instruction*. Washington: National Academy of Sciences, National Research Council, 1961.

Lumsdaine, A. A., May, M. A. & Hadsell, R. S. Questions spliced into a film for motivation and pupil participation. In M. A. May and A. A. Lumsdaine (Eds.) *Learning from Films*. New Haven, Connecticut: Yale University Press, 1958, 72-83.

Maccoby, N., Michael, D. N. & Levine, S. Further studies of student participation procedures in film instruction: Review and preview covert practice, and motivational interactions. In A. A. Lumsdaine (Ed.) *Student Response in Programmed Instruction*. Washington: National Academy of Sciences, National Research Council, 1961, 295-325.

Magoon, T. Innovations in Counseling. *Journal of Counseling Psychology*, 1964, 11, 342-347.

Magoon, M. *An Effective Problem-Solving Model for Vocational-Educational Indecision Problems*. University of Maryland, 1966.

Maltzman, I. On the training of originality. *Psychological Review*, 1960, 67 229=242.

Maltzman, I.,.Begartz, W. & Breger, L. A procedure for increasing word association originality and its transfer effects. *Journal of Experimental Psychology*, 1958, 56, 392-398.

Marshall, J. C. Bayesian decision. *Journal of Counseling Psychology*, 1967, 14, 342-345.

Marston, A. R. Imitation, Self-reinforcement, and reinforcement of another person. *Journal of Personality and Social Psychology*, 1965, 2 (2), 255-261.

Means, G.H. *The influence of problem-solving ability of following an efficient model*. Unpublished doctoral dissertation, University of Alabama, 1966.

Mednick, S. The associative basis of the creative process. *Psychological Review*, 1962, 69, 220-232.

Michael, D.N. and Maccoby, N. Factors influencing the effects of student participation on verbal learning from films: Motivating versus practice effects, "feedback," and overt versus covert responding. In A.A. Lumsdaine (Ed.) *Student Response in Programmed Instruction*. Washington: National Academy of Sciences, National Research Council, 1961, 271-293.

Mischel, W. & Grusec, J. Determinants of the rehearsal and transmission of neutral and aversive behaviors. *Journal of Personality and Social Psychology*, 1966, 3 (2), 197-205.

Nelson, D. E. & Krumboltz, J.D. Stimulating career exploration through "vocational detective" and "simulated work" experiences. *Journal of Employment Counseling*, in press, 1969.

Newell, A., Shaw, J.C., & Simon, H.H. Elements of a theory of human problem solving. *Psychological Review*, 1958, 65, 151-166.

Newell, A. & Simon, H.A. An example of human chess play in the light of chess playing programs. In J. P. Schadé (Ed.) *Progress in Biocybernetics*. Amsterdam: Elsevier Publishing Company, 1965.

Passow, A. H. (Ed.) *Education in Depressed Areas*. New York: Teachers College Press, 1963.

Polya, G. *How to Solve It; A New Aspect of Mathematical Method*. Princeton, New Jersey: Princeton University Press, 1945.

Roe, A. *The Psychology of Occupations*. New York: John Wiley & Sons, Inc., 1956.

Rosenbaum, M. E. & Tucker, I. F. The competence of the model and the learning of imitation and non-imitation. *Journal of Educational Psychology*, 1962, 63, 183-190.

Rothney, J. W. M. *Guidance Practices and Results*. New York: Harper, 1958.

Ryan, T. & Krumboltz, J. D. Effect of planned reinforcement counseling on client decision-making behavior. *Journal of Counseling Psychology*, 1964, 11, 315-323.

Scheer, C. (Ed.) *Cognition: Theory, Research, Promise*. New York: Harper & Row, 1964.

Scodel, A., Ratoosh, P. & Minas, J. S. Some personality correlates of decision-making under conditions of risk. *Behavioral Science*, 1959, 4, 19-29.

Sidorsky, Raymond C. and Mara, Thomas D. "Training Aspects of Computer-aided Decisions Making: 1) Comparison of Two Approaches to Man-Computer Interaction." Abstract of *Technical Report: NAVTRADEVCEN*, 1329-3, 1968.

Sieber, J. E. & Lanzetta, J. R. Some determinants of individual differences in pre-decision information-processing behavior. *Journal of Personality and Social Psychology*, 1966, 4, 561-571.

Siegel, S., Siegel, A. E. & Andrews, J. M. *Choice, Strategy, and Utility*. New York: McGraw-Hill, 1964.

Simon, H. A. *Administrative Behavior*. New York: Macmillan, 1957.

Simon, H. A. *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organization*. New York: Free Press, 1965.

Skinner, B. F. *Science and Human Behavior.* New York, Macmillan, 1953.

Smith, L. J. *Scientific Skills for Decision Making.* Schenectady, New York: Union College Character Research Project, 1968.

Super, D. E., Crites, J., Hummel, R., Moser, H., Overstreet P. & Warnath, C. *Vocational Development: A framework for Research.* New York: Bureau of Publications, Teachers College, Columbia University, 1957.

Tate, M. W., Stanier, B. & Harootunian, B. *Differences between good and poor problem solvers.* Project No. 368. Cooperative Research Program (OE-25024) U. S. Department of Health, Education, and Welfare, Office of Education. (April 1958 to August 1959.)

Thoresen, C. E., Krumboltz, J. D. & Varenhorst, B. Sex of counselors and models: Effect on client career exploration. *Journal of Counseling Psychology,* 1967, 14, 503-508.

Tiedeman, D. V. & O'Hara, R. P. *Career Development: Choice and Adjustment.* New York: College Entrance Examination Board, 1963.

Townsend, J. C. & Smith, W. J. *Predicting decision-making behavior from personality and cognitive variables.* Technical Documentary Report No. EDS-TDR-64-619. Decision Sciences Laboratory Electronic Systems Division Air Force System Command United States Air Force. (November 1964.)

Ulrich, R. E. & Pray, S. L. Comparison of directed self-study versus lecture in teaching general psychology. *Psychological Reports,* 1965, 16, 278.

Walster, E. "Second guessing" important events. *Human Relations,* 1967, 20 (3), 239-249.

Washburne, N. F. & Darmofal, C. F. *Rational and Interactional Decision-Making Roles in Task-Oriented Groups.* The University of Akron, Technical Report No. 4, Contract nonr 4302 (00) NR 177-356. 1967.

Wasserman, P. & Silander, F. S. *Decision-Making: An Annotated Bibliography Supplement, 1958-1963.* Ithaca, New York: Graduate School of Business and Public Administration, Cornell University. (1958 and 1963.)

Werthermer, M. *Productive Thinking.* New York: Harper & Row, 1945.

Wilson, E. H. *A Task Oriented Course in Decision-Making.* Graduate School of Education, Harvard University, April 1967.

Wilson, R. C., Guilford, J. P. & Christensen, P. R. The measurement of individual differences in originality. *Psychological Bulletin,* 1953, 50, 362-370.

Wrenn, C. G. *The Counselor in a Changing World.* Washington: American Personnel and Guidance Association, 1962.

Yabroff, W. W. *Invitation to Decision.* Palo Alto, California: Palo Alto Unified School District, 1966.

APPENDIX A
INSTRUCTIONS TO EXPERIMENTAL ASSISTANTS

INTRODUCTORY AND CONCLUDING REMARKS FOR PROBLEM SOLVING TREATMENT CONDITION

Introduction.

You have all indicated that you would like to learn more about things which could help you solve more effectively the problems that come up in your own personal life; like choosing a career, making new friends, and other such problems. Because knowing how to solve our personal problems is so important for everyone, and because you have expressed a need for such training, you each have been invited here today. Some materials have been prepared to help you learn how to solve problems more effectively. Please pay close attention to what goes on, and follow any further instructions that are given to you.

Conclusion.

Thank you for attending and for helping us by reacting to these problem-solving materials. We hope you have increased your problem-solving skills by being exposed to these materials. You will now be dismissed to return to your regular classes.

INSTRUCTIONS FOR ADDITIONAL PROCEDURES IN TREATMENT CONDITIONS UTILIZING REINFORCEMENT

The presentation that is about to be given will be stopped at three pre-selected points. You have been given a booklet containing a type script of the presentation. Become familiar with the three points at which the presentation will be stopped. They are as follows:

(1) A plus the conclusion of page 5. (Regis: So long, now.)

(2) Conclusion of the next to final paragraph on page 6. (Roy: . . . So I'll know if its the alternative I want to choose.)

(3) Middle of page 9. (Roy: . . . I'll talk over with him what information is needed.)

When you arrive at each of these points, and the presentation has been stopped, you are to ask the student nearest you the folloiwng question:

> Do you think Roy should continue to find out about more alternatives before he makes a final decision about how to spend his summer vacation?

If the student answers in the affirmative, that is, if he or she gives an indication that Roy should explore more alternatives, you should respond with any one of the following comments and record the student's response on your tally sheet.

that's good	great	that's fine
very good	excellent	good
fine		

If however the student response in the negative, that is, gives an indication that Roy need not explore any more alternatives, simply record the student's response on your tally sheet and do not respond to him in any way either verbally or non-verbally.

Follow this procedure with each student until all have responded to the question. Then the presentation will continue until the next pre-selected point at which it should be stopped and you will repeat the above procedure.

TALLY SHEET

	1st Response		2nd Response		3rd Response	
	yes	no	yes	no	yes	no
Student #1						
Student #2						
Student #3						
Student #4						
Student #5						
Student #6						
Student #7						
Student #8						

APPENDIX B

VIDEO-TAPE SCRIPT

Scene 1: School bell rings. Medium shot kids pouring from classrooms. Chatter and sounds but most are not distinguishable.

CUT

Scene 2: Fairly tight shot of two boys at locker. Can be pulling books and coats from lockers.

Carl: Man, I'll never get all that reading done by next Friday. I wish that teacher would take a vacation!

Roy: Yeah, me too, Carl. When I think about all I've got to do before the end of this term, I get sick. At least it won't be too long before summer gets here.

Carl: Summer! Are you kidding? School won't be out for almost three months! That's like years away!

CUT

Scene 3: Medium shot of Cindy at her locker. Pull back to show both as Toni walks up to her.

Toni: Hey, Cindy. Wait up.

Cindy: I thought you'd gone home.

Toni: No, I had to finish something in Mrs. Travers' class that had to be in today.

Cindy: Well, I guess with all that studying you won't have time for summer vacation this year.

Toni: Don't worry. Dad is talking about going on a real vacation this year. I can hardly wait for summer.

Cindy: Well, relax, it's nearly three months away.

CUT

Scene 4: Medium close-up of the boys.

Carl: Look, there's Toni and Cindy. Let's catch up with them.

Scene 5: Medium shot as the boys approach the girls. Group stands at the lockers and talks.

Toni: Dad says we might rent a camper and take off for for about 5 or 6 weeks. We would go to .....

Cindy: Toni's telling about the fabulous vacation she may get to go on this summer.

Carl: Looks like we're all dying for summer to come.

Roy: Well, this is the next to the last one we'll have to worry about.

Cindy: Why?

Roy: Next year we'll be seniors, and after that we can decide what we want to do.

Carl: Just think, after next year I'll be in vacation fo. 12 months or as long as I want it.

Roy. This summer is a pretty important one for me. I've got to decide what I'm gonna do. I don't want to waste 3 months.

Toni: Well, I want to get away from it all. I sure hope that Dad comes through with that vacation.

Carl: I don't have to make any decisions. I'm gonna sleep as much as I can. Wake me up in September!

(Laughter from the others)

Roy: Maybe you've got the best idea after all, Carl. I don't know - I haven't really thought about it that much yet. But I've got to start thinking about it 'cause it will take awhile to decide what I want to do. I'll see you later. I've got to go to class.

(Roy walks away, gesturing to the others.)

Others: So long, Roy. See you later.

Carl: Don't strain your brain planning this summer.

Fade to blackout - return in 3 seconds

2
Scene 1:

Roy sitting in the study hall. Medium shot slowly pulling in to a close up of Roy while thinking. Ends in medium close-up of Roy's head.

Roy: (While reading text book, thinks) I wonder if Carl really has the answer about this summer. Why should I even think about it? Except that the summer vacation's almost three months of time. That's a big chunk of time. There are so many things that I could do. And it's the last summer before I finish high school. Maybe I could use this summer to help me get ideas about what I'm going to do after graduation. And it sure would great to have a little extra money next year. Well, I guess I'd better face it; if I want to get the most out of this summer I'll need to use the best ways I know of solving the problem. (Taking up pencil and paper) I'll make an effort to solve this problem the right way. (Writes while thinking) Problem: What to do during summer vacation? (Thinks) There are a lot of things I could do. I'll list some and find out information about them. (Writes on his page) Alternatives Maybe if I consider several alternative solutions to this problem before I decide, I'll be happier with what I choose.

Class bell rings. Pull back from close-up to medium shot. Other students can be seen gathering their books and leaving the study hall.

Roy: (Thinking) Let's see. I could do what Carl's going to do. Just sleep in every morning, relax and play around as much as possible. I've done that during some other summers. (Writes and speaks) Relax and fool around at home. I wonder how many things there are to do this summer.

Roy gathers his books and leaves.
[FADE OUT - FADE IN]

3
Scene 1: Roy entering Guidance Counselor's office. Medium shot. Mr. Regis and Roy exchange greetings and sit down.

4
Scene 1: In the counselor's office.

Roy: Mr. Regis, I've got a problem and thought you might be able to help me. This summer is coming up and I really want to use it the best way I can. I figured that if I found out about as many things as possible to do during the summer before I decide, I'd be happier with my choice than if I just did the first thing that comes along.

Mr. Regis: That's a good idea, Roy. I think you're right. It's a good approach to problem solving. There are some other good reasons for considering several alternatives when you solve a problem too. When you consider alternatives, it helps you to define the problem clearly. Let's take your problem for instance. If you were going to consider only one or two alternatives, you would probably have defined your problem as "should I get a job or play around" or perhaps "how can I find a job this summer." But because you're attempting to consider many alternatives, you've defined your problem much more clearly, that is, "how can I best use my time this summer," and you've set some goals that you want the solution you choose to fulfill.

Roy: (shot over Roy's shoulder. Roy writes underlined words.) I have some goals but I really haven't written them down or anything. Now that you say that setting goals

is so important, I think I'll write them down. (Writes on first page of tablet as he speaks) I want to make some money this summer. It'll come in handy during the next school year and I can save some too. Another thing is that I'd like to meet people. I enjoy talking to people and I'd like to develop some skills that might help me get a good job later too. But I want some time to just goof around too. (writes recreation time on tablet)

Mr. Regis: Good! Considering several alternatives also effects how you look for information to help you solve your problems and effects how you use that information. The more alternatives you have, the better off you'll be. There's one possible problem there which you should look out for. Some people spend all their time considering alternatives and never making a decision. Or they find that it's too late to make a decision.

Roy: You mean like thinking so long about which girl you want to invite to the movies. When you finally decide on which one, she's got a date! (Both laugh.)

Mr. Regis: That's right! You can't spend an unlimited amount of time on any problem. They demand solutions. So set up some reasonable time limits for yourself and look into several alternatives. Then you will be able to pick one out. Just don't wait until the summer vacation is here to decide. I'll try to give you all the information I have that might help you.

Roy: There's already one alternative in my mind to think about. I've heard alot about summer school and I

want to find out about what courses are available. You know, what it costs and things like that.

Mr. Regis: The catalogue which should have all the information you're looking for will be out next week. Some courses go for five weeks, others for ten weeks, so you could go either the whole summer or just half the summer. Stop in next week and pick up a program of courses to see if there are any you are interested in. You have another six weeks before you have to decide whether or not to sign up anyway.

Roy: I'm not sure I want to go but it's an alternative I want to consider. (writes on paper) #2 Summer school Thanks for your help, Mr. Regis. I'll check back with you once in awhile to see if you have any more information about alternatives.

Roy gets up to leave the office. They say goodbyes, etc. Leaves office.

CUT

5
Scene 1

In the hallway outside of Mr. Regis' office, Roy bumps into Toni Medium shot

Roy: Hi Toni.

Toni: Hey, you've been to see Mr. Regis. What's up?

Roy: Well, I've decided to solve this problem of how to spend my summer vacation in a better way than I normally use in figuring out my problems. Mr. Regis is giving me some help in considering several alternatives before deciding what I actually am going to do.

Toni : And he really did help you?

Roy: You bet. He's been giving me the strategy for solving

all kinds of problems. I guess his main point was to consider several different solutions to a problem and then decide which is best. I will need alot more information on each one, before I can pick one, but my list is growing. And he told me something that I'll have to be careful about in solving a problem.

Toni : What's that?

Roy: Spending all my time looking for alternatives and waiting too long before making a decision.

Toni : Well, lots of luck. I've got to run. I hope I've got my summer problem solved by taking a nice vacation. See you later!

Roy: OK! And thanks, you've given me another idea! See you tomorrow.

(CUT)

-5 A
Scene 1

Roy turns and walks down the hall while thinking. Medium shot to long shot.

Roy: A lot of people take vacations during the summer. there are all sorts of places to go. Of course, there are plenty of disadvantages besides the good things about it. For instance, it costs money. But it's another alternative, and I can study about it some more so I'll know if it's the alternative I want to choose.

FADE OUT FADE IN

6
Scene 1

Long shot of students in hallway. Bell rings and they enter classrooms

Scene 2

Classroom scene. Teacher reading a special bulletin. Students working at desks. Boy enters and hands the teacher a piece of paper. Long shot pulling in on teacher when she talks.

Teacher: Can I have your attention for a few minutes. There are a few messages and announcements that I have to read to you. Anyone interested in trying out for the wrestling team are asked to meet in Room 124 at 3:00 on Thursday. Coach Anderson ask that you be on time.

The YMCA is asking for volunteers to act as camp counselors this summer at Camp Laguna. You must be at least 16, a good swimmer and have some camping experience. For more information, contact Mr. Daily at the local YMCA.....

The teacher's voice continues but the level fades down and Roy's voice (as a thought) comes up. The camera moves in on Roy.

Roy: Hey, that's another idea! (Takes out paper and pencil and writes) #4 Volunteer Work - at the YMCA as a camp counselor! There must be dozens of different opportunities like that during the summer. There are all sorts of organizations giving service or help to other people. I wonder how many of them are looking for help this summer. (The bell rings. Camera pulls back to show students leaving the classroom. Roy starts to get up to leave. He is still thinking) I'd get a chance to meet alot of new people and it would be sort of like having a job. Of course, I wouldn't make much money. But I would be helping other people and that's groovy. (Roy walks up to Mrs. Blair, the teacher) Mrs. Blair,

who was that you said we should contact if we're interested in the YMCA thing?

FADE OUT-FADE IN

7
Scene 1: In Roy's house. He enters the living room and greets his father. Long shot pulling in on Roy and his father when seated.

Roy: Hi Dad, how's it going?

Father: Pretty fair, Roy! How was your day?

Roy: OK, I guess. I've been trying to figure out what I should do this summer.

Father: So far ahead?

Roy: Well, it's less than three months away and it takes time to find out what things I might do. I'm trying to do a good job of problem solving if I can.

Father: Sounds good. Can I help?

Roy: Since I'm trying to consider several alternatives or possible solutions to my problem, well, maybe you have some more ideas for me. I've got to find out alot more about each of the alternatives I have on my list. So far, I have four listed. First, I could spend my summer just relaxing and foolin' around. That's what Carl says he is going to do. Second, I could go to summer school. I could either improve a grade in a course I have taken or advance in my subjects for my senior year. Maybe then I won't have to take a full load. Another alternative is that I could do volunteer work, Mrs. Blair read a bulletin from the YMCA about their needing counselors this summer and I can think of plenty of other groups around town who can use volunteer workers. Toni gave me my fourth alternative.

She said that her family is going on a long vacation so I listed Travel as my fourth alternative.

Father: Well, you've really been working at this problem. If I'm not mistaken, I've heard you talking to your mother about getting some kind of training or education after high school, haven't you?

Roy: I haven't really decided yet. Maybe I'll get some vocational training this summer. I'm sure that I need more training or at least more specialized training in order to get a good job after high school. That's assuming I decide not to go to college. Maybe I could get a full time job this summer and see how it goes.

Father: That's a good possibility. Besides learning what it's like to have a full time job, you can make some money to use next year or save for getting more education or training after high school. Check with your counselor and with the local state employment office. Maybe you can have a job lined up before school gets out. I can check around for you and see if anyone I know might have some summer jobs.

Roy: Gee Dad, that's great. I'll watch the newspaper ads and go downtown to the large stores. They may have some openings.

Father: Here's another idea. Why don't you see about getting some vocational training this summer. There are several private training schools in the area that give courses in many different job skills and occupations.

I'm sure your counselor can tell you what they are. You could start preparing for a good job after high school right now.

Roy: OK. I"ll check with Mr. Regis tomorrow on it. You know, I might be able to do a couple of these things rather than just one.

Father: I'd put that combination idea as another alternative.

Roy: I'd better go write some of these things down before I forget them. That list is really growing.

Father: Slow down, old man. You know this list can become too long. Maybe you had better limit yourself to some reasonable time limit. Select the alternative you want after you have found out all the pertinent information.

Roy: Hey Dad, that's just what Mr. Regis said. The point is slowly sinking in. I have to be able to choose one of these alternatives - not just keep an ever growing list. Most of them look pretty good. There isn't one I wouldn't mind doing. WEll, I have an appointment with Mr. REgis in a couple of days and I'll talk over with him what information is needed.

FADE OUT-FADE IN ON NEXT SCENE

8
Scene 1: Two days later in Mr. Regis' office.
FADE IN AUDIO . Medium shot of Roy and Mr. Regis talking

Mr. Regis: From what you've told me so far Roy, you're gathering some excellent alternatives for this summer. But we need to discuss what you do with these alternatives.

Roy : That's a good idea. What do you do when you consider alternatives?

Mr. Regis: There are really three things to do and you've worked on two of them already. You've thought about the things that might happen if you pick a particular alternative; in other words, possible outcomes. You have your notebook with you, don't you? Turn to one of the alternatives and I'll show you what I mean. Read what you have there.

Shot over Roy's shoulder.

Roy: Well, one of my alternatives is to get a full-time job this summer. Then I've got a heading called possible results.

Mr. Regis: That's what I mean. You've figured out what good things and what unpleasant things might happen if you pick that alternative. Go on.

Roy: First, I have Possible Good Results. (1) making a good amount of money, (2) learning what it's like to have a job, (3) possibly develop skills that would help me in later jobs. Then I have, Possible Bad Results. These are (1) not much time to myself to do whatever I want and (2) may have to take a job I don't like.

Mr. Regis: Well, we could probably think of more possible outcomes and maybe you'll want to do that later, but that's very good. As you get several alternative solutions to a problem, you consider each one first by discovering what the possible outcomes for each alternative are and this you have already done. If you decide to work full time this summer, some of the results might be good, and others not good. Next, you decide how much you want each of these outcomes to happen. You've done that already, too, by saying that some are good outcomes and others bad. Now, some people like to go into more detail on that and maybe rate each outcome as to just how desirable it is, but that's up to you. The important thing to remember is to find out what the possible results are that might come from selecting each alternative, and estimate how desirable or undesirable each of these outcomes are to you. Then find out how likely each of these good and bad outcomes is. I mean, what's the chance each will happen. For instance, the chance that you'll make some money if you decide to work full time is pretty high, and the possibility of developing job skills which will help you in later jobs isn't so high. (Regis and Roy discuss estimating probability of outcome). So when you consider each alternative, figure out the possible good and bad results, decide how likely each one is to happen and how desirable or undesirable each outcome is, and then match

that alternative up with your goals to see how it fits them.

Roy: That's a lot to remember, but I think I've got it. I'll check back from time to time to let you know how things are going.

9

Scene 1: Show time lapse (calendar number). Two weeks before the end of school. Cindy, Toni, Roy and Carl are eating in the cafeteria.

Carl: Well, if we could have won that game last Friday, it would have put us in the playoffs. Now I guess it's wait until next year. At least football comes right away next fall.

Roy: With most of our starting team back, we could take the league title.

Carl: Only if nobody's looking. We looked pretty bad in practice this week.

Cindy: Say, Roy, whatever happened to that project of yours. You were having these talks with Mr. Regis on how to solve problems.

Roy: Oh, I haven't forgotten. As a matter of fact, I'm all set up for this summer. I got word a couple of weeks ago that I was accepted to work at Bowman's department store four days a week all summer and on Fridays and Saturdays I'm going to be a weekend counselor at one of the YMCA camps up by Madera Lake.

Carl: Hey, that sounds like fun. You'll make money at your job and get a chance to relax and play around.

Roy: The camp job will be work too Carl, but it's a change of pace and more relaxed al'right.

Toni: Well, while you're working, I'm going to be having fun

and seeing new places. Travel--that's the life for me. We may see half of the states in the country. Of course, Dad isn't quite sure about the trip yet, but I'm sure it's just a couple of details to be worked out. We're sure to go.

Carl: How about someone coming along to help eat the food?

Toni: Roy, how did you decide what you were going to do this summer?

Roy: Well, it took some work, but it was worth it. First, I tried to say just exactly what my problem was and decided exactly what I wanted to get out of the summer. Like for instance, I wanted to have a solution to the problem that would get me some money this summer, but I didn't want to be tied down all the time. Then I tried to consider several alternatives before I made a decision. I got ideas from alot of people including some of you. One of my alternatives was to travel, so I got all sorts of information on travel, where to go, what to see, how much it cost, etc. Another alternative was to get a summer job, so I found out about a lot of different jobs; what you make, what you do, the hours and working conditions.

Toni: Where did Mr. Regis fit into all this?

Roy: He helped understand what you do when you consider alternatives. First, I figured out the possible results of picking each alternative, the good and bad things that might happen. Then, I estimated just how likely each possible result was--you know, what's

the chance that each one of them might happen? There's no use picking an alternative if the good results you think are going to happen don't have much of a chance of happening. Then I was ready to select an alternative and put it into action. I looked at each alternative in terms of all I had learned about it and how it fit my goals.

Carl: Maybe I ought to do something like that. I've just been thinking about how great it will be to get out of school for three months and relax and do nothin'. But it sounds like you're really going to have some good things going this summer.

(Bell rings).

Toni: Gee, I wonder what things there are that I could do. I wonder what's best for me.

Roy: Well, there's one good way to find out. The process of considering several alternatives worked well for me. I'll help you if you want me to.

Carl: Right now it's time to get to class.

(They start to get up.) Scene FADES.

10
Scene 1

It's the first day at school and this scene is in the school building near the lockers. It starts as a long shot but zooms in on Roy and Carl talking by their lockers.

Roy: Hi, Carl, got all your books yet?

Carl: Just about. There's this huge line in the library where the Social Studies books are being handed out. I guess I'll wait on that one. You know, in a funny way, it feels good to be back here. It know that sounds weird but it's better than doing nothing.

Roy: What do you mean "nothing"? I thought you were going to have a great time. You said you were going to look for things to do this summer. What happened?

Carl: I was but I guess I waited too long to get started. I started to do like you said: to look into alternatives but the jobs were taken before I got there and - well, I just started too late. Another failure by the Great Carl. I seem to go about solving my problems the wrong way. I can think of lots of things I want to figure out where your way could be very useful. Like whether or not I should go to college - the Senior Worry.

Roy and Carl walk down the hall towards the library. They continue talking. Medium long shot.

Roy: Well, did you do what you were planning to do before? Some glorious goofing around and relaxin'

Carl: Sure, that was fine for a month or so - sleeping in every morning, doing nothing. But pretty soon it got to be a drag.

Roy and Carl enter the library and stand on a line waiting for books. Medium shot. Carl continues talking.

Carl: But it got to be pretty much of a drag. Everyone else was doing something interesting, making money or something else. So here I am, with the summer gone and nothing to show for it.

(The line is moving very slowly.)

Roy: Well, maybe next summer can be different for you.

(They reach the counter and are handed their books. They leave the library and talk in the hall.)

Carl: One thing is sure. I'm going to start earlier. Maybe if I'd consider alternatives, I could have seen way ahead that I was headed for a lousy summer. I'd like to try solving my problems in the way Mr. Regis showed to you. Even if I decided to goof around part of the time, I would have something else to do. When you come over tomorrow, let's spend some time talking about it. You know, exactly how it was all figured out and that stuff.

Roy: Sure. I'll be happy to tell you what I learned. There's Toni and Cindy over there. I want to find out how their summers went. See you later, Carl.

[Camera trucks along with Roy walking over to the girls.]

10
Scene 2.

Roy approaches Toni and Cindy in the hallway.

Roy: Hi, Cindy, Toni. How was your summer?

Toni: Don't even mention it. Let's forget the subject.

Roy: What's going on? I thought you were going to come back and tell us about the rest of the world. Wasn"t it fun?

Cindy: She didn't go, Roy.

Roy: What? I thought it was a sure thing. What happened?

Toni: Oh, something came up at Dad's job so he only got one week's vacation. The rest of the time I just had to find things to do on my own. It was miserable what with all the little brothers I have and their monster friends. Mom stuck me with babysitting 'cause I was always free.

Roy: Well, I suppose one week was better than nothing. So the summer was bad.

Toni: The worst. But I guess it was partly my fault.

Cindy: Why?

Toni: Well, I was so sure about the trip.I never really listened to you when you explained how you solved your summer problem, Roy.

(They slowly walk down the hall towards the school entrance.)

Toni: I could still have picked travel as my first choice but if I had followed your ideas about considering several alternatives, I'd have been all set to do something else if my first choice didn't work out. The first time Iheard about the possibility of our going on a long vacation, I just stopped thinking about anything else to do during the summer. That's what you (looking at Roy) would call "not considering alternatives". I just considered one. So when that roof fell in, I didn't have anything else left. At least I'll know better next time. That's the last time I'll do that. The old saying of putting all the eggs in one basket. Ugh. I'm convinced Roy. I'll try your way next time.

Roy: WEll, I did have a second alternative in case my first

didn't work out. Doing that was simple because I had information on all the possible alterantives. I can see now that it was a good idea Mr. Regis suggested. How about you Cindy? How did things go for you?

Cindy: OK I guess. But I sort of drifted also. When you talked about how you were solving your problem, I started to find out about some alternatives for things to do during the summer and got all confused. It was fun finding out about things, but I did start awfully late and I never got around to deciding anything. So, I just sort of drifted through the summer. I'm beginning to think that I would have had a much better summer if I had used your strategy.

Roy: That sounds like what Mr. Regis warned me about happened to you. He said there was a real danger of spending too much time looking into alternatives.

Cindy: Enough about my hard luck story. I read some groovy books...You haven't told us about what you actually did this summer.

Toni: Come on, cheer us up. Let one of our group have had a decent summer. Or did your summer plans go haywire too?

Roy: I feel like I'm rubbing it in after what happened to you. But my summer was great! I had a job at Bowman's for 4 days a week and did the YMCA counseling on the weekends. Some funny things happened at that job at Bowman's like the time.....

FADE OUT - PAUSE- FADE IN

Scene 1: Later that same day as Roy is talking with his father in the living room.

Roy: (To father) I guess I really came out lucky, Dad! Cindy spent too much time just looking for alternatives to do; Carl got started way late and did't have a very good summer either; and poor Toni. She seemed so disappointed when I saw her today. Putting all her hopes into one alternative without considering others and then having it flop.

When I started that little project last spring, I didn't think it would make much difference at all. But it sure did. I made some money, found out what it was like to have the responsibilities of holding down a job, had fun and met a lot of new people while working with the kids at YMCA camp. Both gave me ideas for what I want to do after high school, too. All in all, it's been a good summer.

Father: Sounds like that method for solving problems was the right way for you.

Roy: I'm sure of it now. The main thing was finding out about and considering several alternatives before deciding on a solution to the problem. By doing that, I came out much better than I would have otherwise. You know, since all this has worked out so well, there's some other problems that I want to tackle this way. I was thinking about my decision whether or not to attent college.....

FADE IN AND UP MUSIC AND TITLES

THE END

APPENDIX C

ORAL LECTURE SCRIPT

Everyone here today is a problem solver. You've already solved thousands of problems during your lifetime. Even things which you now don't consider to be problems at all were once very difficult problems for you to solve. For example, tying your shoelace. I don't imagine there's anyone here today who can't do a pretty fair job of tying his shoelace. Can any of you remember when you could not tie your shoelace? At one point in your life, doing this very simple things was very difficult. Your mother or father may have helped you practice, or had you start by just doing part of the knot and then had you do more of the task yourself. Gradually in time and with a lot of effort you became able to tie your own shoelaces. With some help, you solved what seemed to you, at the time, a big problem.

In a way things haven't changed very much. You are still attemtping to solve difficult problems but the types of problems you solve have changed. Each of you think for a moment of some problem that you have in your life right now. It may be: whom to date? where to go on Saturday? what courses to take next year? what career to go into? or any one of a thousand other decisions. Knowing how to go about solving these and other problems that you come up against is tremendously important. It affects your whole life from the time you're born until your death. The way you solve your problems affects the lives of other people. Numerous authorities believe that many of the people who are having the most trouble in our society just don't know how to solve problems. For example, perhaps the person who steals faces a problem of needing money and steals because he doesn't know any other way to solve his problem. He makes a bad choice; he decides to steal. Many adults who get divorced may not have the skills needed to solve personalproblems that develop in their marriage and therefore wind up getting a divorce. Some psychologists tell us that many of the people whom they help need to learn how to solve problems that occur in their lives. Perhaps

there are those of us who could certainly solve our problems more effectively than we do, if we just knew how to do it.

As life gets more complicated, there are more and more problems for each of you to solve, and the problems get more difficult. Such problems as whether or not to go to college wouldn't have faced most of us if we had lived 100 years ago. As another example, take the problem of deciding on a career. During the last century, there were relatively few jobs that existed and most of us would have simply done what our fathers did for a living. But now, there are more than 40,000 different kinds of jbos in the United States and a student rarely follows the same job as his father. There are many other examples that could be used to prove the point. You will continue to face more difficult problems as life gets more complex and as you grow older.

But how can you learn to solve problems effectively? I am going to talk about several things to do and then talk more about one of the most important of those things. First, whenever you have a decision to make or have a problem to solve, you need first of all to define clearly what that problem is. For instance, suppose there is a school dance and a good movie on the same night. Rather than just say that your problem is "What should I do?" or "Should I go to the movie or the dance?", you should be more clear and say that your problem is, "How should I spend my time Friday night?" Also, when we define what the problem is, we should give any conditions which have to be met by a solution we choose to solve the problem. For instance, if we want to make sure we spend the least money possible, and that's the most important thing to us, we should include that in our definition of the problem. You want to decide what to do Friday night that will cost you the least amount of money, while still allowing you to leave the house and have a good time. So now you know what the problem is and could tell someone else exactly what it is.

Another important thing to do in solving problems of all kinds is to get information on various opportunities. If you are trying to decide on what courses

to take next year, you need to get accurate information about what courses there are, what you do in each of them, which ones you need to graduate, what your interests and abilities are, and a lot of other information which could help you. In our problem about what to do Friday night, we would need information on the dance, the movie, and on other things that are available to do. There are many other things involved in getting helpful information of course. We must know where to go to find the information we want. This is called the source of information. And once we find a good source, we have to know how to use that source. If we want information from a dictionary, for example, which is one source of information, we must know how to use a dictionary.

There are many other things that could be mentioned which would help in solving problems more effectively, such as being more aware of when a problem actually exists, how to select an alternative solution to the problem, how to implement the solution you choose, and how to examine your problem solving behavior in order to improve it.

Today we want to spend most of our time talking about one of the most important parts of the problem-solving process. The things you learn will be of help to you in solving the problems that you meet throughout your life. This aspect of problem-solving is the consideration of several alternative solutions to the problem before making a decision about how best to solve the problem. What does htat men? Making a decision is the part of the problem-solving process in which you choose the course of action you are going to take in solving the problem. Considering several alternatives before making a decision means that you should think about and study different ways to solve the problem before you choose the one way you think best. Let's assume your problem is how to get from here to San Francisco. Before you just start walking down the street toward San Francisco, it would be better to consider other ways of solving the problem, such as going by train, plane, car, boat and possibly other ways. It sounds very simple in this example but many of us often forget to do this when

we work with problems in our own lives. Often, we try to solve the problem in the way that looks like the easiest, or try the first thing that comes into our mind.

Why is it important to consider several alternatives and how does it affect the rest of the problem-solving process? Considering several alternatives before deciding on a solution to your problem will affect most of the things you od throughout the whole problem-solving process. First, how might considering several alternatives affect how you define the problem? Let's return to the earlier example of the dance and movie on the same night. If you didn't try to consider several alternatives you would probably define your problem as, "Should I go to the dance or the movie on Friday night?" If however, you keep in mind that you want to consider <u>many</u> alternative solutions to the problem before you make a decision on which solution is best, you would probably define the problem as, "How shall I use my time Friday evening?" This will let you think of many more ways to solve the problem than just going to the dance or movies. You could also consider having a party, playing table tennis, or perhaps reading a book.

A second way that considering several alternatives can affect the way you solve the problem is that it will let you get more information before you decide. You will also be more open to information on the problem from many different sources. Psychologists have learned that when people only consider one alternative as they solve a problem, that they tend to avoid or not pay attention to information about other ways to solve the problem. They have made a decision too early in the problem solving process and don't want information which might show that they mad made a bad choice. Considering many alternatives will let you get a much wider variety of information. Looking for information in this way gives you ideas for even more alternative solutions to the problem.

Another good effect of considering several alternatives is that you will be more likely to pick an alternative that will work well. If you pick one alternative from five different ones you've studied, the chances that it will work are greater

than if you only consider one and choose that one by default. In other words you'll probably have a better chance of successfully solving the problem.

If you consider one alternative only, and it fails, research tells us that you probably won't be able to learn what you did wrong. That is, you may go on making the same kind of mistakes when you try to solve problems in the future. If you consider only one alternative and it doesn't work out, it will be much harder for you to admit that it didn't work and more difficult for you to learn from what you did wrong in order to solve a problem better in the future. Considering only one alternative seems to lessen a person's ability to objectively look at what he did and see his mistakes. In contract it would be easier to analyze the problem-solving process you've gone through and learn more from it if you've considered several alternatives as you solve the problem.

The last major effect of considering several alternatives before deciding is that you will probably select a second alternative from those you considered, to use if the first way to solve the problem doesn't work. Putting it another way, if you plan on one alternative right away and never consider any other ways to solve the problem, you won't know what to do if the one alternative doesn't work out. However, if many alternatives are considered, and something comes up that prevents you from carrying out that solution, or if you can see that the way you picked isn't working, then you have a second way to solve the problem to which you can shift. Let's look at an example of this happening.

Vince decided he wanted some kind of education after high school. His best friend was planning on going away to State University, so Vince just figured he'd go there too. In fact, he didn't even investigate any other possibilities. When he received a letter saying that the university had already accepted as many new students as it could, Vince found it was too late to apply anywhere else. He had lost at least a year in getting started because he had no "backup" plan to use when his first choice of a solution to his problem didn't work out. In contrast, Vince's friend Ted had investigated four or five different schools and while he

received the same letter Vince did from State University, two of the other colleges to which Ted applied accepted him and he already had decided what he would do if State University did not accept him.

We've talked about some of the effects that considering several alternative solutions has on the whole problem-solving process. But you might still ask, how do I actually do it? Show me how to consider several alternatives. First, where do you get alternative solutions to the problem?

One thing that will help you is to ask other people for ideas. They may have had similar problems themselves or know of people that have. Perhaps they can provide you with suggestions as to different ways to solve the problem you face.

Another way to find alternatives is to look closely for them in the information you collect about your problem. Let's say you have the problem of picking out a new article of clothing. Specifically your problem is to pick out a blue sweater and stay within the amount of money you have set aside for it. Upon finding a sweater that meets your qualifications, the sales person tells you the store is out of your size. Some people might automatically think to themselves that they will have to either go to another store or not buy the article of clothing at all. However, if you are looking for alternatives to consider, this piece of information should give you at least these new alternatives.

1. See if the store has other branches and if they do, maybe they have your size or something you'd like better.
2. Find out if they will be getting more stock of that item or maybe something even better and wait to buy your new clothes.
3. Investigate how the article of clothing is cut. It may be that you can wear a size you don't normally wear.

Another good way to find alternatives is to combine one or more of them. For instance, rather than deciding to go to a party or the movie, maybe you can do both. Rather than either getting a summer job or going to summer school,

perhaps the individual would take one summer school course and work the rest of the time,or take night classes and work full time during the day. We've mentioned several ways of finding alternatives. There are many other ways including brainstorming and other techniques.

But even if you find several alternatives, what is meant when we say you should "consider" each one? In urging you to solve problems in this manner you need to know just what you do when you "consider" an alternative.

There are several things that you do when considering an alternative. One is to find out what must be done to take advantage of that alternative. If you are tyring to solve the problem of how to meet new people, one alternative would be to place yourself in situations where you don't know anyone. To carry out this alternative you have to find situations in which you don't know anyone, and you must put forth the effort to place yourself in these situations. Another alternative would be to go with someone you know to places or events where there are many people you do not know and have your friend introduce you to some new friends. This would involve contacting a friend and getting him or her to help, going to the event or places you decided upon, and actually being introduced to others. You might also want to find out what you should wear, about any costs in going to these events, and other items of information.

Another thing that needs to be done when an alternative is considered is to find out the possible consequences of choosing the alternative. Let's stick with the problem of wanting to meet new people. First, let's list a few of the alternatives that someone might uncover in trying to solve this problem.

1. Purposely go by yourself to places or events where you know no one.
2. Ask the help of a friend in going with you to most places and introduce you to all the people he or she knows.
3. Practice various things to say when introducing yourself to someone new. These could be practiced with some friends you know well.

4. Join some organized social group where perhaps there will be others who would like to meet new friends.
5. Find other people who would like to work on the same problem and hold a discussion with them.

Five possible alternatives for solving the problem have been listed. What possible consequences might occur as a result of choosing each of these alternatives?

Take the first alternative for example. Alternative #1--Purposely go by yourself to places or events where you know no one.

One possible consequence that might occur is that you will be completely ignored. Perhaps no one will come up and talk to you at all. Another possible consequence is that you will have to go many, many times to several new places before you will be successful in meeting new people. But all the possible consequences are not negative or undesirable.

Possible positive consequences that could result from choosing this alternative include finding many new friends at the first place you visit or finding a new interest or hobby through attending the places or events you choose. That is, although you went originally for the purpose of meeting new people, something else that's pleasant may occur that wasn't included in your original purpose for going.

Similarly, in considering several alternatives, each of the other possible alternatives should be studied closely to discover all the possible outcomes from each. There are several possible outcomes, both positive and negative, from each of the alternative solutions we have talked about.

Once each alternative has been studied for possible outcomes, these outcomes or consequences must be judged as to their probability of occurrence and their desirability. How and why do you do this? In looking over the possible consequences of a particular alternative, some of them have almost no chance of happening; others may have a 50/50 chance of occurrence, and some may be almost

certain to happen. Suppose you decided to not select alternative #1 as the solution to the problem because one of the spossible consequences might be that absolutely no one would talk to you at the event you choose to go to. Discarding alternative #1 for that reason is rather unwise since that particular outcome has a small chance of happening. If you can assess in some way the chance that each of the possible outcomes might happen, you can be sure that each possible outcome has the right amount of influence in your decision as to which of the solutions to the problem you should choose to try. If an outcome has a high chance of happening, you would probably give it a little more influence in your decision than if it has practically no chance of happening.

There are really two ways to find out what the chance is that a possible outcome will happen. One is to just estimate it yourself. This is a personal estimate of how likely that outcome is.

For example, let's say that in thinking about how likely it is that no one at all will talk to you when you attend an event alone, from all you know and from your past experience you decide that there is only at 20% chance that such a thing could happen. You'd say that 80% of the time at least someone at the event would talk to you. 20% is your personal estimate of how probable it is that no one at all will talk to you. Or you can just say that it is quite unlikely to happen. Whether your estimate is in percentages or words doesn't really matter, just so you have an idea as to how likely a particular outcome is.

Another way to get an idea about how likely a particular outcome is to happen is called objective probability. There may be information for example on the experience of other people who did the same thing. If someone shows you a table showing that when people like you did what you plan to do, 30% of the time no one spoke to them. You have an objective probability estimate that there is a 30% chance that no one will speak to you when you attend the event. Both of these methods help you decide how likely it is that a particular consequence of an alternative might occur, thus assisting you in deciding just how you choose to

solve the problem.

A second major consideration with regard to stuyding possible consequences of alternatives is the desirability of each outcome happening. It may be enough to just label each of the possible outcomes as positive or negative as we have. Those labeled as positive, you would like to see happen; and those labeled negative you do not want to see happen. Whether a possible outcome is desirable or undesirable has a big influence on your choice of a possible solution. Some outcomes might be so undesirable that you would discard an alternative solution in order to avoid the possibility of those outcomes occurring. On the other hand, some might be so desirable that you would choose that alternative with the hope that they would occur. The main factor that helps you decide on the degree to which a particular outcome is desirable or undesirable is your own personal values. There may be general values such as religion or security that are important to you, or the values may be specific to the problem you're trying to solve. For instance, for one person the thing that's most important in solving the problem of how to meet new friends is such as wanting to meet a certain kind of person as a new friend, For another person solving the same problemm getting the problem solved within a certain amount of time is the most important thing. One you know what things you want to get in a solution to the problem and what things are important to you generally, you can estimate how deisrable or undesirable a particular outcome is. Some people try to rate each outcome along a scale of desirability with such categories as very desirable, slightly desirable, slightly undesirable, very undesirable. Others choose to rank all the possible outcomes from a particular alternative with the most desirable one at the top and the most undesirable at the bottom of the list. Exactly how you do this doesn't matter. The important thing is to know how desirable or undesirable for you, each possible outcome is.

Let's review the things you should do when you consider several alternative solutions to problems. You investigate several possible solutions to the problem, which you gathered from several sources. You determine in general what you would need to do to implement each of these alternatives. Further, you study each alternative solution to the problem in relation to the possible consequences or results that might occur if you choose that alternative, as well as how probable and how desirable the occurrence of each possible outcome is. Now each alternative with the information about it and its consequences is studied in relation to the rest of the information you have about the problem. Keeping in mind the nature of the problem, what things you want to achieve in a solution, and other problem information you gather, you are ready to start the process of actually selecting an alternative solution to be implemented.

All the things we have discussed are involved in the aspect of problem-solving known as the consideration of multiple alternative solutions to the problem.

This discussion has been presented because all of us are called upon to solve many problems that come up in our life, such as selecting courses to take in school, whether or not to go to college, how to make friends, what career to choose and other problems. Considering several alternatives to the problem is an important skill which will help us all to solve problems more effectively. We have talked about why it is important, and just how a person does it. Try to put the things you've learned today into action as you try to solve problems you face in your life right now and as new problems come up.

APPENDIX D

INSTRUCTION SHEET
AND SLIDE PROGRAM

Name_____

Jerry's Problem

Directions:

You are being asked to assist a high school student named Jerry in solving a problem he faces in his personal life. Information which can help you do this has been placed on a series of slides. One or more of these slides has been placed in each of the red envelopes on the table. Attached to this paper is a program describing which slides are contained in each envelope and the information on each slide that is available to you. The assistant will show you exactly how to operate the slide projector. You may look at as many slides as you wish and you may look at them in any order and for as long as you wish. At the end of 10 minutes you will be asked to write down on the bottom of this paper which of the possible available solutions you think Jerry should choose, in order to solve his problem wisely.

You must remain in the room for the entire 10 minutes. You may use as much of the 10 minutes as you wish to help Jerry make his decision. As you can see, there are other available activities in the room if you choose to us a portion of the 10 minutes on something other than helping Jerry solve his problem. When you finish with an envelope, please put the slides back that belong in it so that others may use the materials.

Now please give your attention to the assistant who will help you learn how to use the projector.

TO BE COMPLETED AT THE END OF 10 MINUTES

I think Jerry should choose solution A B C D E F
(circle the solution you think is best for Jerry)

Thank you for helping Jerry solve his problem.

SLIDE PROGRAM

Envelope #1 This is Jerry's problem and his goals for solving it.

Slide #1. Explains what Jerry's problem is.

Slide #2. Jerry's goals in solving the problem.

Envelope #2 Information about Jerry.

Slide #3. About Jerry's past life.

Slide #4. Jerry's interests.

Slide #5. Jerry's abilities.

Slide #6. Things in life that are important to Jerry.

Slide #7. Jerry's goals for the future.

Envelope #3. These are the school activities available to Jerry.

Slide #8. Some school clubs.

Slide #9. Special interest groups.

Slide #10. Musical organizations.

Slide #11. Student government.

Slide #12. Varsity sports.

Slide #13. Intra-mural sports.

Slide #14. Work study program.

Envelope #4. Possible Solution

Slide #15 Solution A
#21 possible good outcomes
#22 possible bad outcomes

Envelope #5. Possible Solution

Slide #16 Solution B
#23 possible good outcomes
#24 possible bad outcomes

Envelope #6. Possible Solution

Slide #17 Solution C
#25 possible good outcomes
#26 possible bad outcomes

Envelope #7. Possible Solution

Slide #18 Solution D
#27 possible good outcomes
#28 possible bad outcomes

Envelope #8 Possible Solution

Slide #19 Solution E
#29 possible good outcomes
#30 possible bad coutcomes

Envelope #9 Possible Solution

Slide #20 Solution F
#31 possible good outcomes
#32 possible bad coutcomes

APPENDIX E

CAPTIONS OF SLIDES USED IN HYPOTHETICAL PROBLEM-SOLVING SIMULATION

This is Jerry's problem.

Slide #1. This is Jerry. Next month when school opens he will be a senior in high school. The problem he must solve is this: what school activities should be take part in during his senior year?

These are the requirements Jerry's problem solution must meet.

Slide #2. Jerry wants a solution to his problem which will meet all of these requirements if possible. a) He wants to meet new people. b) He wants to get some regular physical exercise. c) He wants the activities to cost very little money. d) He wants the activities to allow him time for his hobby on Saturdays.

Information about Jerry

Slide #3. Personal History: Jerry grew up in a town close to a large city. He has a brother and a sister. His father has a good job and his mother is a housewife. He has lived in two different towns. He played baseball in Little League and has a couple of awards for his musical ability.

Slide #4. Interests: Music and building models have been Jerry's two main hobbies, but he is interested in outdoor activities such as camping and sports. He received a school letter in one sport in high school and enjoys performing in assemblies. Clerical tasks, math assignments and science experiments aren't too interesting to him. He enjoys talking with people and being in group activities.

Slide #5. Abilities: Tests and grades show that Jerry performs best in music and physical education classes. His next best work is in speech and social studies courses. He does average work in English and shop. In science

and math he doesn't perform as well. He is skilled at getting along with and talking to people.

Slide #6. Values: Jerry thinks being liked by other people is very important. He works hard in most of his classes because he feels it's good to see how much he can learn about a lot of different subjects. He is active in his church and feels that family, friends, and education, experiencing many different things in life are most important.

Slide #7. Life goals: Eventually, Jerry looks forward to getting married and settling down. Before then, however, he wants to do some traveling, develop his musical and athletic abilities and also wants training after high school for a steady job.

<u>These are the school activities available to Jerry</u>

Slide #8. There are subject matter clubs based on courses like Spanish and Chemistry. Anyone can join if he is interested and membership fees are very small. Meetings are on week nights.

Slide #9. Several special interest groups have clubs at Jerry's school. These include Photography Club, Music Club, Coin Club, Ji-Y, and others. These clubs can be joined by anyone interested. They often have projects or activities on week ends.

Slide #10. There are many music groups that Jerry could join. The orchester, stage band, pep band, and other groups are open to students by trying out.

Slide #11. There are several opportunities for participating in student government. Besides running for student body office, there are committees planning school events and trying to solve various school problems. Meetings take place during class time, on week ends, or after school. Running for office requires that each candidate use his own money to campaign.

Slide #12. Jerry's high school participates in golf, tennis, football, basketball, baseball, swimming, and ice hockey. Practices are every night after school during the season with games on week nights or Saturdays depending on the sport.

Slide #13. The school sponsors intra-mural sports. Many of the organizations within the school have teams entered in the intra-mural league and anyone can form a team and play. Games are held during noon hours and after school. Teams decide on their own practice schedules.

Slide #14. A work-study program has been started at the high school. The students in the program take four subjects in the morning. They are placed on a job in town each afternoon and receive pay for their work.

Alternative Solutions to Jerry's problem.

Slide #15. Alternative #1--Not to participate at all.

Slide #16. Alternative #2--To go out for varsity sports.

Slide #17. Alternative #3--To participate in school government during the first half of the year and then to go out for sports the second half, after his term of office is over.

Slide #18. Alternative #4--To join the music club and to combine that with being in the work-study program.

Slide #19. Alternative #5--To join a club and to form a team from the club to participate in the intra-mural sports program.

Slide #20. Alternative #6--To participate in everything concerned with music. Join the music club, pep band, orchestra, and other musical groups.

Possible Outcomes of Jerry's Alternatives.

Slide #21. Alternative #1 Possible Positive Outcomes 1) might improve his grade point average; 2) might get some reading and studying done that might help him get into college or vocational school. 3) might have time for a part time job or his hobbies.

Slide #22. Alternative #1 Possible Negative Outcomes 1) some schools and colleges think students' being in school activities is important. Jerry might hurt his chances by not being in any activities; 2) probably won't meet as many new people; 3) won't have as much opportunity for regular physical exercise.

Slide #23. Alternative #2 Possible Positive Outcomes 1) might be a good opportunity for developing physical abilities; 2) might meet friends involved in sports; 3) might get prestige from being on school teams; 4) colleges might be interested in his athletic ability.

Slide #24. Alternative #2 Possible Negative Outcomes 1) might take a lot of time; 2) might hurt grades; 3) might cut out possibility of other activities or a part time job; 4) might cut down on his time for hobbies and for music; 5) might receive physical injury.

Slide #25. Alternative #3 Possible Positive Outcomes 1) combines two alternatives he's interested in and gives him the variety he likes; 2) might meet a wide variety of new people; 3) both might help his chances of being accepted by colleges and by other post high school educational opprotunities.

Slide #26. Alternative #3 Possible Negative Outcomes 1) both these activities might be very time consuming. Little time for job or hobbies. 2) might receive physical injury from sports. 3) many student government activities are during class time. 4) running for office takes money for campaigning.

Slide #27. Alternative #4 Possible Positive Outcomes 1) might improve both music skills and skills for future jobs. 2) might be able to save money for after graduation from high school. 3) being in work-study program might improve his chances for some vocational or educational opportunities after graduation from high school.

Slide #28. Alternative #4 Possible Negative Outcomes 1) might not be able to take all the school courses he should or wants to because of working during part of the school day. 2) being in work study program might lessen his chances for acceptance at some colleges. 3) these activities might not carry as much prestige as some others.

Slide #29. Alternative #5 Possible Positive Outcomes 1) might meet many new people through both club activities and intra-mural sports activities. 2) might take less total time than some other activities and leave time for hobbies. 3) might get a variety of physical exercise.

Slide #30. Alternative #5 Possible Negative Outcomes 1) these activities might not have as much prestige as some other activities. 2) music club--might not want to participate that much in intra-mural sports. 3) Some colleges would want more activities than that on a student's record.

Slide #31. Alternative #6 Possible Positive Outcomes 1) he would develop his music ability. 2) might meet some new friends.

Slide #32. Alternative #6 Possible Negative Outcomes 1) might be bored by spending so much time in one interest area. 2) might not do well in anything because of being in too many groups and some activities of various groups might conflict.

APPENDIX F

OBSERVATION FORM FOR
EXPERIMENTAL ASSISTANT Name_____

Jerry's Problem

	Env.#1 Slides		Env. #2 Slides					Env. #3 Slides							Env. #4 Elides			Env. #5 Slides			Env. #6 Slides			Env. #7 Slides			Env. #8 Slides			Env. #9 Slides		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	21	22	16	23	24	17	25	26	18	27	28	19	29	30	20	31	32
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Solving a Personal Problem

	Person A	Person B	Person C	Person D	Person E	Person F
Photograph						
Life History						
Interests						
Abilities						
Values						

APPENDIX G

CONTENTS OF INFORMATION PACKETS INCLUDING TAPE CARTRIDGE SCRIPTS USED IN PERSONAL PROBLEM-SOLVING SIMULATION

Alternative #1

Envelope #1. Photograph of Susan.

Envelope #2. Life History--Susan was born in the south. She has one brother and went to college. Susan hopes to finish her college work someday. During high school she was in a bad auto wreck, but she has slowly recovered. Her ability in sports is about average.

Envelope #3. Susan's Interests--Susan is very interested in teaching children, and likes to be outdoors enjoying nature. She plays sports and especially enjoys swimming. Music and reading are her hobbies. Though not very interested in cooking, or traveling, she likes to be involved in a variety of different activities. Susan watches TV only as company for doing housework. She is interested in current affairs and politics and likes to work on civic improvement projects.

Envelope #4. Susan's Abilities--In school, Susan did well in English, history, and music; about average in math, physical education, and science; and not very well in her business courses; she reads faster than most other girls, and enjoys discussing what she reads. Her vocabulary is fairly large; she speaks well, and she expresses what she thinks effectively. However she feels weak in math and doesn't understand mechanical things. She sews well but has never learned much about cooking.

Envelope #5. Susan's Values--Susan thinks a person's family is very important. Her main goal now is to make a happy home for her husband and children. Someday Susan would like to finish her college degree. She enjoys talking with people but finds it hard to accept or to agree with many

Envelope #5 (continued)

of the things they do. Though she has some outside activities in the community, Susan feels these activities are not too important. She would like to take a long vacation. Susan feels that by creating a happy home and raising her children to be good people that she is doing the most important thing possible.

Alternative #2

Envelope #1. Photograph of Leon.

Envelope #2. Leon's Life History--Born in western United States, Leon was seriously ill when he was young but recovered and is now in good health. His family moved several times so he attended several schools while growing up. He decided to try and make schools better by becoming a school counselor. He worked part time to help pay his way through college. During college he got married and he and his wife now have three children. He is now a counselor at a local high school.

Envelope #3. Leon's Interests--Leon plays golf whenever he can. He also enjoys tennis and swimming. He likes to come to work each day because he gets to talk with many different people. It's rewarding for him to try to help other people. He doesn't like clerical tasks like filling out forms and doing mathematical problems. Reading and music are his favorite hobbies. One of the things he doesn't like is to be in the spotlight or to be the leader of an activity.

Envelope #4. Leon's Abilities--Leon finds it easy to talk to people. He also has considerable ability in writing but is not very good at math or at figuring out puzzles and analytical kinds of things. He is about average in his physical abilities (e.g., sports).

Alternative #2 (continued)

Envelope #5. Leon's Values--Helping other people is the thing that's most important to Leon. He feels his work allows him to do this somewhat, but not enough. He doesn't belong to any church and sees no need for religion. If he can feel that he's helping other people, he's happy. Politics and other such things are all less important than the feeling of helping. He is not particularly interested in making a lot of money--just enough to keep his family supplied with the necessities.

Alternative #3.

Envelope #1. Photograph of Shirley.

Envelope #2. Shirley's Life History--Shirley had a nice home but felt that her parents didn't really care about her. She ran away several times and on one accasion was given some drugs by a friend. During the 11th grade she dropped out of school and left home permanently. She is now looking for a job and is 20 years old. Since she left home two major things have happened to her. First, she was in jail for a robbery she committee to get money for drugs. Second, she has been confined to a hospital where she managed to stop taking drugs.

Envelope #3. Shirley's Interests--In junior high school Shirley was interested in sports and in music. Then she lost interest in all of school except math, and now isn't sure what she's interested in. She likes to be with other people but is afraid because most people she knows now would get her back on dope. She's not interested at all in men anymore and avoids most social situations. Her main interest now is to get a job and to have a chance to start over again and to stay away from drugs.

Alternative #3 (continued)

Envelope #4. Shirley's Abilities. Shirley isn't in very good health anymore so her physical abilities are below average. However, during high school she did learn to type and take shorthand a little and has been practicing these skills on her own. She has considerable ability in the areas of secretarial work and in mathematics. As far as her musical and other abilities are concerned, she'll have to begin to develop them all over again.

Envelope #5. Shirley's Values--In the last five years Shirley's values have changed a great deal. Before, she cared only about doing whatever she wanted to do or having fun. She feels she has learned a lot form her experiences but wants others to avoid going through what she has. She now thinks it is better to stay in a situation and work to make it better than to run away like she did from home and school. Getting a good education, finding people who will trust her, who will honestly care about her and will be her friends are the most important things to her now, along with getting a good job.

Alternative #4.

Envelope #1. Photograph of Dan.

Envelope #2. Dan's Life History--Dan was born back in Ohio in 1880. He moved out west as a young boy and still can remember somewhat about what the old west was like. He's worked on the railroad, in hard coal mines, and later in a factory until he retired about 25 years ago. He never married and now lives alone in a small apartment in California. He only finished the 6th grade in school, but is still alert and intelligent.

Alternative #4. (continued)

Envelope #3. Dan's Interests--Current events interest Dan. He has seen so much happen during his lifetime. He enjoys fishing and being outdoors. He has played around for several years with several inventions, and has a small workshop in his apartment in which he spends a lot of his time. He doesn't read much anymore but enjoys television.

Envelope #4. Dan's Abilities--Dan has always been physically strong and still goes for regular long walks each day. When young he was good at playing football, baseball and other sports. Though not a fast reader, and not very good at writing, he has considerable ability at building things, on discovering how things work, and in repairing them.

Envelope #5. Dan's Values--Though many things have changed, Dan thinks the world and people in general aren't much different than they were when he was a young man. He has always felt that doing what you want to do is the most important thing in life. Live your life for yourself and no one else is his motto. Dan's philosophy is that everybody's different and each person ought to go his own way.

Alternative #5.

Envelope #1. Photograph of Ray

Envelope #2. Ray's Life History--Ray was born during the early part of World War II, in 1941. He has several brothers and sisters and grew up in the Midwest in the state of Missouri. At first he planned on being an athlete. However, during college he spent a year in Europe and when he returned he decided to become a minister. He has not yet married.

Alternative #5. (continued)

Envelope #3. Ray's Interests--Always an active fisherman, Ray also goes skindiving. He attends sporting events whenever he can. Art is Ray's other major interest. Since his year in Europe, he has collected prints of famous paintings. The weekends are Ray's busiest time so he seldom dates. He doesn't enjoy doing anything mathematical or scientific, nor does he like TV. Ray reads a lot of books on many different subjects.

Envelope #4. Ray's Abilities--While in college, Ray did his best work in Psychology and Sociology. He was also above average in English, art and foreign languages. Once in a while he took a math or scienve course and did not do very well. Ray can write skillfully and is a very fast reader. He is somewhat nervous when meeting and talking with people. He works best with ideas and the expression of them through writing or art.

Envelope #5. Ray's Personal Values--Ray has tried to study what great men have thought was important in life. He now feels that there are certain true ideas that should be taught to everyone because they will help people to live better. Finding the truth and expressing it are the most important things to do in life. Life is very short and what we do here determines what our influence on others will be. Ray believes that we live on after we die through the influence we have had on others.

Alternative #6.

Envelope #1. Photograph of Margaret.

Envelope #2. Margaret's Life History--Margaret was born in a large city in the East. Her parents worked hard to send Margaret to the finest school they could find. She did well in school, participated in many activities and went to an exclusive women's college. After graduating, while

Envelope #2. (continued)

traveling in Europe, she met the man who later became her husband. He is an executive and they have a nice home in the best section of town. They have two children.

Envelope #3. Margaret's Interests--Margaret enjoys being with people, working on committees and organizing group activities. She works half time at a ladies' dress shop and spends most of her other time working in civic projects and fund raising drives for charities. She doesn't like being home because she feels too tied down. Though her husband wanted more children, Margaret felt she was too busy in her civic activities and other things more important to her. She wants to place the children in private schools as soon as possible to make sure they receive the best education.

Envelope #4. Margaret's Abilities--Reading novels and persuading other people by what she says are the two things Margaret does best. She's also quite good at math. She's not very strong physically and hasn't developed the skills needed to cook or to keep house. She finds it very difficult to talk to children. Margaret is also uncomfortable around adults who are not in her social group. She feels that she doesn't communicate with her husband much anymore.

Envelope #5. Margaret's Values--Margaret thinks that improving the cultural and social life of the community are the things that are really important in life. If a person will get the finest education possible and then become involved in improving the community, the person will be happy. What other people think about you is very important too, of course. Women should go into careers and should try to improve society. Margaret feels that religious and athletic activites are not valuable.

APPENDIX H
INSTRUCTIONAL SHEET
AND
INFORMATION PACKET PROGRAM

Name_____

Solving a Personal Problem

Directions:

Think of a problem you are facing in your own personal life right now. It may be something that you have been thinking about for sometime, such as "what career should I choose?" or "should I go to college?;" or it may be something that must be solved very soon, such as "who can I tell about what I've done?" or "there's a person I want to meet. How can I meet that person?" Write the problem you're thinking about on the next line if you want to. You do not have to write it down if you prefer to keep it to yourself.

_____

_____

Pretend that you want to select someone to work with you to help solve the problem you are thinking about. If you could select someone, whom would you choose? Information has been prepared on several people you might like to choose. The infromation is contained in the envelopes you see on the table. Notice there are 6 piles of envelopes, one pile for each person on whom information is available. A program is attached to this paper describing what information is contained in each envelope. Some of the information has been placed on tape cartridges and the assistant will, in a few minutes, show you how to use the tape recorder. Once you begin you may get information from as many envelopes and in any order you wish. At the end of ten minutes you will be asked to write the number of the person you selected down at the bottom of this page. You must remain in the room for the entire ten minutes. You may use all or part of the time to arrive at your choice. There are other materials in the room for your use if you choose to use some of your time on something other than the problem. Now give your attention to the assistant who will show you how to use the equipment.

To be completed at the end of 10 minutes

I have selected person # A B C D E F as the person I would want to help me solve my problem. (circle your choice)

PERSONAL PROBLEM-SOLVING SITUATION

Program of available information:

There are five information envelopes available on each of the six persons you might want to choose to help you solve the problem you are thinking about. In each pile of envelopes is the following:

Envelope #1 contains a photograph of the person and his name.

Envelope #2 contains a tape cartridge. The tape contains a description of the person's life history. This means that it tells about what important things have happened in the person's life.

Envelope #3 contains a tape cartridge. The tape describes the interests of the person; that is, things he enjoys doing.

Envelope #4 contains a tape cartridge. The tape describes the things that the person does quite well and other things that he does not do very well; that is, his abilities.

Envelope #5 contains a tape cartridge. The tape describes the person's values; that is, those things that the person thinks are important in life.

APPENDIX I.

CHECKLIST FOR SOLVING PROBLEMS IN REAL LIFE

Directions: This is not a test. The purposes of this checklist are to find out how high school students solve problems in their personal lives and to discover if students would like help in learning how to solve these problems better. We are talking not about math or science problems, but rather about personal problems that come up from time to time in your life such as:

1. what courses to take next year
2. how to meet new friends
3. what vocation to select
4. how to get along better with your fellow students.

Step 1. On the reverse side of this page, sign your name in the space provided and circle your present grade level. We need this information so that we can provide help in solving problems to the students who want it.

Step 2. Read each of the statements on the reverse side of this page. These statements describe how people sometimes go about solving problems. Read each statement carefully. Then do the following:

Step 3. If you usually do the behavior described when you solve problems in your life or the statement describes how you feel, place a check mark (✔) in the column marked "True" to the right of that statement.

If you do not do the behavior described when you solve problems in your life or the statement does not describe how you feel, place a check mark (✔) in the column marked "False" to the right of that statement.

For example, read statement number one. If you usually do consider many different ways to solve a problem before trying to solve it, you would make a check mark (✔) in the column marked "True." However, if you usually do not consider many different ways to solve a problem before trying to solve it, you would check the column marked "False."

Step 4. As you make a check mark for each statement, circle the number of every statement that describes a behavior you'd like to improve. For example, read statement number one again. If you'd like to learn how to consider many possible solutions to a problem, circle number one, after you place the check mark in one of the answer columns.

Remember now that this is not a test.

Be honest and careful in making your answers. Your answers are confidential. They will be used to help students like you. Be sure to sign your name on the line on the reverse side of this page. This way your counselors and teachers will know which students would like help.

Begin now. Be sure to answer all the statements.

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YOUR NAME_____ GRADE (Circle One) 9 10 11 12

Place a check mark in the appropriate column

Read each statement carefully.

		True	False
1.	When solving a problem, I usually do consider many different possible solutions to it.		
2.	I usually do not have a good method or strategy that I use to look for possible solutions to the problems that come up in my life.		
3.	After solving a problem, I usually do study the method I used to solve it (in order to learn from my experience).		
4.	When trying to solve a problem I usually do not know how to tell if a piece of new information I find will help me in solving my problem.		
5.	When I've decided on a plan for solving a problem, I do not figure out exactly what needs to be done to carry out the plan.		
6.	I usually do know about and consider the possible results, good and bad, of each possible solution to my problem.		
7.	I usually do not know how to find information which will help me solve a problem.		
8.	I usually do not decide what things I want in a solution to a problem; that is, I do not know how to tell a good solution from a bad one.		
9.	I usually do not know how to define a problem; that is, I usually do not know exactly what the problem is.		
10.	I usually do pick out a second way to solve a problem to use in case something goes wrong with my first solution.		
11.	I do want to learn how to solve my personal problems better.		
12.	I do want to learn how to do all the problem-solving behaviors talked about in these statements.		

DO NOT FORGET TO CIRCLE THE NUMBER OF EACH STATEMENT THAT DESCRIBED A BEHAVIOR YOU WOULD LIKE TO IMPROVE.

APPENDIX J. Name_____

STUDENT REACTION SHEET

Please give your reactions and comments about the guidance materials you have just worked with by answering the questions below.

1. Were the materials and problems with which you worked interesting?

2. Was enough information available for you to solve the problems presented in the materials?

3. Do you think these materials would be interesting to other high school students?

4. Are there ways in which these materials will help you solve your own personal problems more effectively?

5. Would you be interested in working with other materials like these in the future?

6. Make any additional comments that you would like about the materials in the space below.

APPENDIX K

SAMPLE SCORES ON DEPENDENT VARIABLE G

AND HOW THEY WERE OBTAINED

In order to illustrate in concrete terms the rationale and effects of the scoring system formulated for variable G, the following chart has been developed. Each of the three figures represents a manner in which a subject might distribute his selection of information packets in the Personal Problem Situation. In order to make the scores comparable. each hypothetical subject has been limited to 10 selections. The numbers in parenthesis represent the number of points awarded for each selection. In Figure A, a subject has given at least some consideration to as many alternatives as were available and has chosen to explore one of these alternatives in a great deal of depth. The subject represented in Figure B chose to ignore all but two of the available alternatives and make all of his selections from these two. Finally, Figure C illustrates a distribution of information selection which considers many alternatives and, in addition explores each alternative to some degree. It can thus be seen that the same number of selections can be distributed in a number of ways and that the scoring system devised for variable G rewards both the consideration of a wide variety of alternatives and the exploration to some degree of each alternative as well. The strategy of selection used in Figure C yielded the highest score (54) in the three examples provided on the next page.

SAMPLE SCORES ON DEPENDENT VARIABLE G

AND HOW THEY WERE OBTAINED

Figure A

Information Packets	Alternatives #1	#2	#3	#4	#5	#6
#1	x(5)	x(5)	x(5)	x(5)	x(5)	x(5)
#2	x(4)					
#3	x(3)					
#4	x(2)					
#5	x(1)					

Total Score 40

Figure B

Information Packets	Alternatives #1	#2	#3	#4	#5	#6
#1	x(5)	x(5)	x(5)	x(5)	x(5)	x(5)
#2	x(4)				x(4)	
#3	x(3)				x(3)	
#4	x(2)				x(2)	
#5	x(1)				x(1)	

Total Score 30

Figure C

Information Packets	Alternatives #1	#2	#3	#4	#5	#6
#1	x(5)	x(5)	x(5)	x(5)	x(5)	x(5)
#2		x(4)			x(4)	
#3	x(4)			x(4)		
#4			x(4)			x(4)
#5						

Total Score 54

APPENDIX L
SCORABLE RESPONSES ON CHECKLIST FOR
SOLVING PROBLEMS IN REAL LIFE

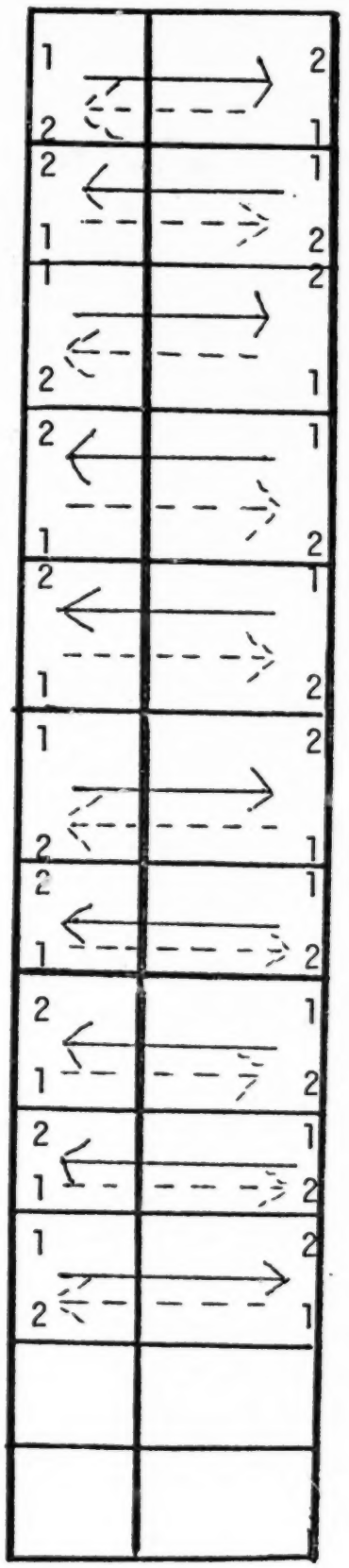
GRADE

YOUR NAME_____(Circle One) 9 10 11 12

Place a check mark in the appropriate column

Read each statement carefully.

		True	False
1.	When solving a problem, I usually do consider many different possible solutions to it.		
2.	I usually do not have a good method or strategy that I use to look for possible solutions to the problems that come up in my life.		
3.	After solving a problem, I usually do study the method I used to solve it (in order to learn from my experience).		
4.	When trying to solve a problem I usually do not know how to tell if a piece of new information I find will help me in solving my problem.		
5.	When I've decided on a plan for solving a problem, I do not figure out exactly what needs to be done to carry out the plan.		
6.	I usually do know about and consider the possible results, good and bad, of each possible solution to my problem.		
7.	I usually do not know how to find information which will help me solve a problem.		
8.	I usually do not decide what things I want in a solution to a problem; that is, I do not know how to tell a good solution from a bad one.		
9.	I usually do not know how to define a problem; that is, I usually do not know exactly what the problem is.		
10.	I usually do pick out a second way to solve a problem to use in case something goes wrong with my first solution.		
11.	I do want to learn how to solve my personal problems better.		
12.	I do want to learn how to do all the problem-solving behaviors talked about in these statements.		



DO NOT FORGET TO CIRCLE THE NUMBER OF EACH STATEMENT THAT DESCRIBED A BEHAVIOR YOU WOULD LIKE TO IMPROVE.

NOTE: The numbers one and two above refer respectively to the pre-treatment and post-treatment administering of this instrument. Solid arrows indicate changes in response that received a score of +1. They are favorable changes in self-reported behavior. Dotted arrows indicate changes in responses receiving a score of -1. Such changes are unfavorable changes in self-reported problem-solving behavior.